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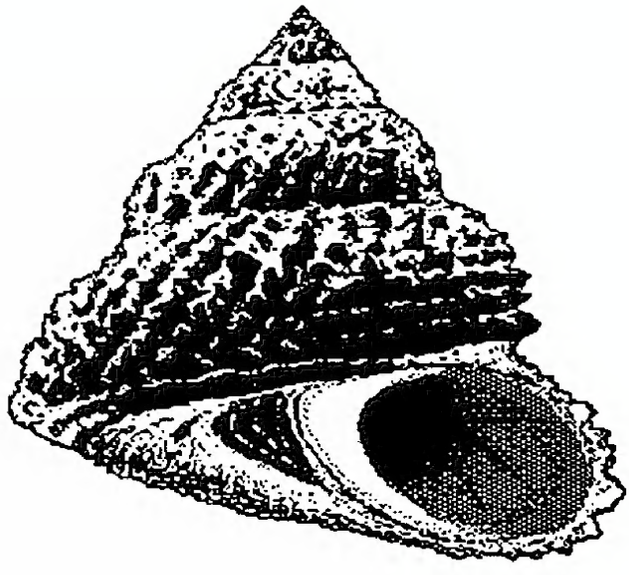

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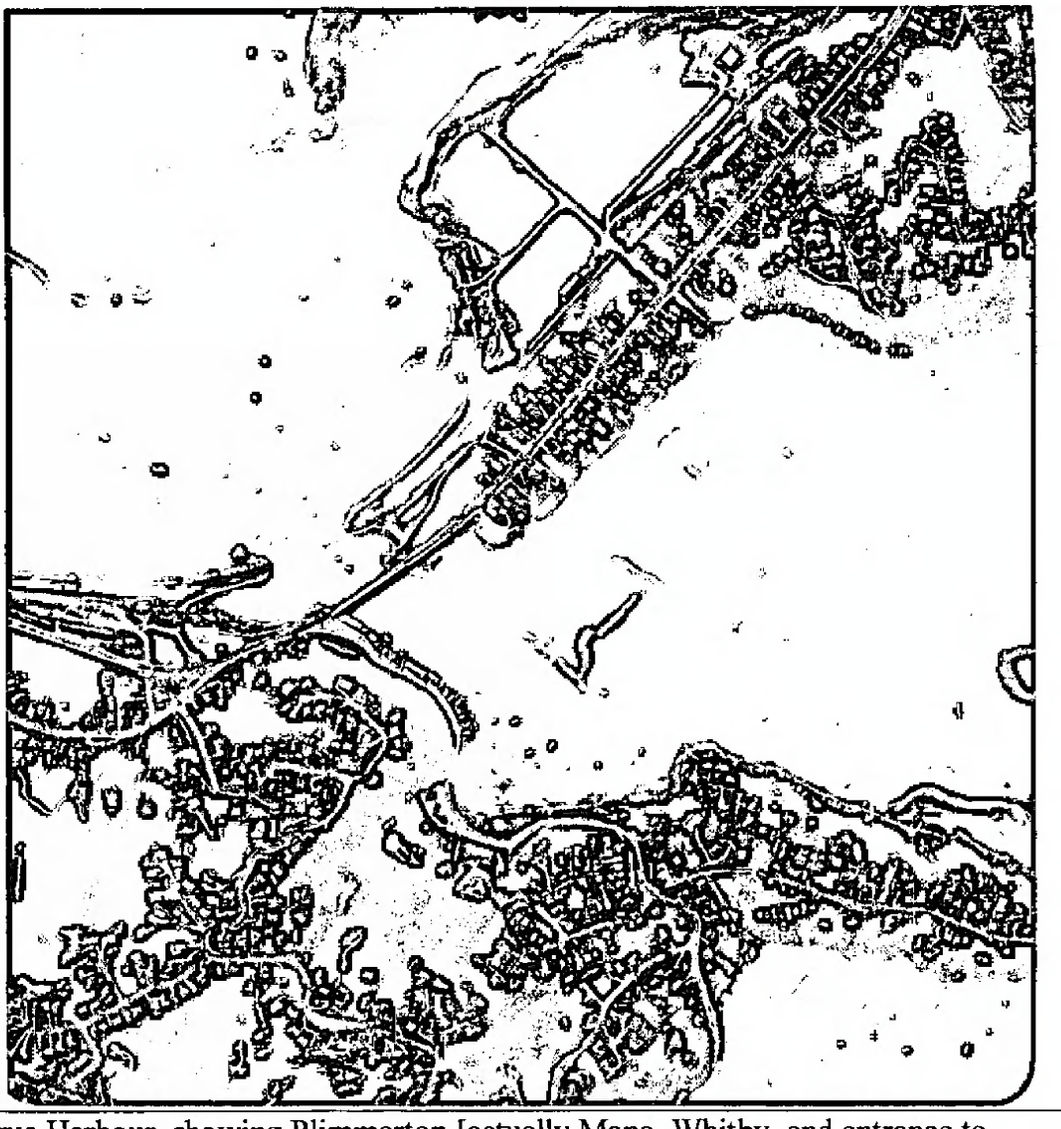
PAUATAHANUI INLET (PORIRUA HARBOUR): RECENT AND SUBFOSSIL MOLLUSCAN ASSOCIATIONS

By O.J. Marston

Porirua Harbour, on the west coast of the Wellington province, has two parts: the Porirua Inlet, extending in a southwesterly direction towards the city centre of Porirua, and the Pauatahanui Inlet in an easterly direction.



"Porirua Harbour, showing Plimmerton [actually Mana, Whitby, and entrance to Pauatahanui Inlet on the right]." Originally published in *NAC Airline Review* No. 54, 1970. The suction dredge is in the middle of the embayment towards the northern approach to the bridges; the bulldozer workings on the Ngatitoa Domain are towards to top right. Thanks to NZ Aerial Mapping Ltd for permission to republish this photograph.

The harbour is approached through a deep water channel between the Whitireia Peninsula on the west and a flat area on the east which is, to-day, called Mana but formerly was variously known as Plimmerton, Paremata, the Paremata Flat, and, rather quaintly, Dolly Varden (named after the racing skiff of its early landowner James Walker, the name being changed to Mana in 1955). This flat, on its west, is the Ngatitoa Domain, on the southern edge of which lie the remains of the historic Fort Paremata. To the east are shops, motels and houses, an area divided by the main trunk railway and State Highway 1 which cross the entrance to the Pauatahanui Inlet over two bridge to the south of which lies the present-day Paremata. North of Mana is the coastal village of Plimmerton, with a hilly housing area on the northwest corner of the Inlet known as Camborne. The whole region is of very great cultural interest, both Maori and European, and of considerable ecological, biological, and geological significance also. Pauatahanui Inlet is an outstanding example of an estuarine wetland. Studies since the late 1960s have highlighted its national importance but it still remains under threat from economic and commercial development. Pauatahanui Inlet fully merits continuing study and protection as a very special ecosystem which, in fact, also has some features of international scientific interest.

When I was new to Wellington in January 1965, Mrs E. Y. (Betty) Wolf described the working of the Paremata suction dredge to me, and the various molluscan treasures which were being deposited on the shore, especially *Zeacolpus delli*. Among the obviously dead shells were also freshly dead or still live *Solemya parkinsoni*, presumably living in a top layer of mud. A broken valve of *Panopea smithae* collected indicated a greater depth being worked at the dredge site than was expected.

One visit showed a bulldozer working on the Ngatitoa Domain, excavating where the sports pavilions and toilets now stand. Investigations revealed mainly bivalves, and some *Zenatia acinaces* were still paired. Most common of all was *Myadora antipodum*, yet I was to discover later that this was the only locality where they occurred, since *Myadora striata* could be found at all other places.

Further into the Pauatahanui Inlet is a beach which the Wellington Shell Club members know as the Grays Road Beach, where the road from Camborne subdivision descends to sea level. Very long dead *Cyclomactra ovata* occurred in the mud out in the bay, but they were packed full of fine sand which, when washed out, yielded little gems of *Chemnitzia zelandica*. Strangely, freshly dead *Cyclomactra ovata* occurred in the same mud in that bay. I still hadn't realised the significance of the connection of those three apparently disparate localities.

After a year in England, when I'd missed the Wellington news, my friend Mr Kaye R. McNabb of Onekaka advised me to get out to Pauatahanui to see the piles of shells there. The church of St Alban was built on the hilltop above the stream at the head of the Inlet because that's where the Maori pa was situated in the 1840s, so we expected to find broken shells and exploded oven stones, evidence of human activity, but we were wrong. The scallops there were still in perfect pairs, and the *Alcithoe arabica* had not been broken open. Following along the line of a filled in ditch we found single valves of *Chlamys gemmulata* and *Panopea zelandica*, pairs of *Neilo australis* and unbroken *Cominella adspersa* and *Struthiolaria papulosa*. At that time there were notices cautioning anyone from digging because the Kapuni gasline had been laid beneath.

We offered the best specimens to Dr Frank Climo for the Museum collections, then returned to the site again next weekend. The Pauatahanui Inlet had appeared to be boring mudflats which supported little except the mud snails *Amphibola crenata, Diloma subrostrata*; bubble shells *Haminoea* and limpets *Notoacmea helmsi* – but, suddenly, we had discovered shells said to be obtainable only by trawling offshore. The most desirable bivalves found were pairs of *Dosinia greyi*, but also unbroken were *Cyclomactra ovata* and *Dosinia lambata*.

The New Zealand Historic Places Trust's booklet about the old Paremata fort (located behind the boat club buildings to the northwest of the main road bridge) refers to the earthquakes of the 1850s, and how they destroyed the fort (Burnett 1963). It was becoming apparent to me that the Pauatahanui Inlet was not merely mudflats which had built up because Europeans had cleared away the bush, but that earthquake uplift had actually been raising the inlet itself, goodness-knows how often in pre-recorded times.

After heavy rain I turned up at the Grays Road beach, fortuitously as it turned out, since the main stream had cut into a soft bank just above the highest tide level, exposing two perfect paired *Panopea zelandica* still in their living position, with their siphonal ends pointing upwards but now filled with detritus. Bruce Hazelwood and Don Watson told me they had also found a pair there.

From our knowledge of the live-harvesting of *Panopea* at Pakawau in Tasman Bay, the shells seem to live at a water depth of at least 5 metres at dead low water; hence, to find subfossil shells *in situ* above high tide level would seem to indicate that the Greys Road beach has probably been subject to uplift of greater than 5 metres. That does mean to say that it was raised to all that height in a single uplift, but it could have done so. The Murchison earthquake of 1929, for instance, hurled the main road up by 17 feet, as a notice by the roadside points out to this day.

I began to consult such background articles about the Porirua/Pauatahanui area that I could obtain, and our Editor lent me even more from his long-standing interest in the geological history and archaeology of the region. But the more articles that I read, written over the last 70 years or so, the more confusing I found the situation. Therefore I am not attempting to offer a précis of the geological history of the Inlet to explain the occurrence of these molluscan deposits and how they came to be there. Rather I am referring to subfossil shells which I have personally collected, and highlighting why their presence is of particular interest. Much of this material, originally curated by Dr Frank Climo, is lodged in the collections of what is now the Museum of New Zealand Te Papa Tongarewa, and hence provides a reference source for future more specialised study.

What began originally as a list just of the subfossil shells of Pauatahanui section of the Kapuni Gasline has been expanded to include the other collection localities, which seems to be quite logical since as principal shell species occur at the four major localities of Ngati Toa Domain, Suction Dredge working at Mana, the Greys Road Beach, and the Kapuni gasline trenching itself.

To find *Panopea* sp., *Zenatia acinaces*, *Bassina yatei*, and *Myadora srtiata*, *i.e.* what Powell (1979) termed "sandy, ocean beach shells" at the first two of these collection localities would be quite reasonable, but to find the same species as far into the Inlet as Grays Road and the gasline transect at the head of the Inlet is impossible if the beaches were the same when they lived there as they are today – so there must be some events to explain this.

AREA 1 - NGATITOA DOMAIN

In geological terms the flat land now occupied by Paremata/Mana/Dolly Varden (as it been variously called over time) is quite young or recent in formation, and is now basically the result of levelled sand dunes. A matter of mere hundreds or a few thousands of years this same area must have been a huge entrance from the open ocean into what is now the Pauatahanui Inlet (Adkin (1921: 154, figs 4-6) – and copied, more clearly, by Stevens (1974: fig. 8.44) – shows how this may have come about). Spat of ocean beach dwelling species of molluscs were swept right into within metres of what is now the Pauatahanui village, which, today, is dry land with adjoining brackish water margins supporting the mud snail *Amphibola crenata* and a couple of species of *Potamopyrgus* snails. Increased run-off from the now bush-cleared hills means that *Bassina yatei*, *Zenatia acinaces*, *Dosinia greyi*, *Divaricella huttoniana*, *Pratulum pulchellum*, and *Chlamys gemmulata* could not possibly survive in such a brackish environment.

The Paremata flat appears now virtually as an enclosed shingle spit between the outer ocean and what has changed to become an inner harbour of greatly reduced salinity. The molluscs uncovered by the bulldozers on the flat were living there *in situ* at one stage, not merely washed up on the tide line, so presumably that area has been subjected to the same earthquake uplifts as the Greys Road Beach and the rest of the Inlet. A selection of species typically uncovered there (with the measurements of the largest shells noted) are:

Cyclomactra ovata (85 x 73 mm)
Pratulum pulchellum (26 x 21 mm)
Amalda mucronata (39 x 19 mm)

Significantly absent, however, were species which can survive on even more turbulent open, but sandy, ocean coasts, notably the "surf clams", *Mactra discors*, *M. murchisoni*, *Spisula aequilateralis*, *Paphies ventricosa*, *P. subtriangulata*, or *Angulus gaimardi*. These species are "colonial" living and occur today along the open Kapiti coast in a clean sand environment.

AREA 2 – SUCTION DREDGE, PAREMATA FLAT [Mana]

This modest-sized suction dredge floated on pontoons and functioned throughout the 1960s. A segmented pipeline carried the dredgings to shore where, after screening, the sand was sold to offset the cost of dredging out the extended boat marina. At very low tides it was then easy to see the solid banks of shells which the dredge was sucking into, and under favourable conditions, even today, it can be possible to see the strata close towards the railway bridge. From the representative shells gleaned from the bulldozers' work above sea level on the Ngatitoa Domain, I should imagine that the same species would continue through the strata on the same level as where the dredge was working. Unfortunately, the slurry from the dredging was pumped at high pressure through a metal screen, so that many large shells, such as scallops, including *Pallium convexum*, were smashed, but it was surprising, all the same, what escaped. I arrived once to find that two Club members ahead of me had retrieved two unbroken Maori adzes from the screen. The most unexpected species was *Panopea smithae*; although broken , the diagnostic pallial sinus was visible. This species is normally associated with oyster dredging activities in Foveaux Strait or around the Chatham Islands at depths from 40 to 60 fathoms [*i.e.* 73–109 metres], so obviously the suction dredge was bringing up material which had been originally deposited at a considerable depth. *Panopea zelandica* is associated with sheltered, calm, muddy environments, frequently as shallow as 10 metres at low water. [See my comments on dwarf missshapen *Panopea* of both species cast ashore on Marfell's Beach – Marston 2000: 5.].

Measurements of the largest shells of these representative species are given here to indicate that the shells must have been flourishing in a very healthy environment, and were not depauperate like the unfortunate species living in the central Te Whanga lagoon on the Chatham Islands, which similarly has only one connection with the outside sea.

SPECIES	Dimensions in millimetres
Austrofusus chathamensis	70 x 34
Struthiolaria papulosa	73 x 45
Zeacolpus vittatus	55 x 15
Bassina yatei	47 x 41
Dosinia subrosea	58 x 57
Divaricella huttoniana	40 x 36
Ostrea chilensis lutaria	89 x 73
Zenatia acinaces	110 x 45

Some of our Club members who collected there also may find they have specimens larger than above, but I think these are about the largest that survived being through the metal screen designed to separate shells and other solid material from the final payload of sand. Approximately 110 species are listed from this location, and in some cases it must be a moot point as to whether the shells are "subfossil", or recently dead. In most instances it seems that both situations are true, since the species has continued to survive through time. Accordingly, it has been safer for me to list all the shells recorded since most of the species represented probably fall into both categories.

AREA 3 – BOATSHEDS BETWEEN ROAD BRIDGES AND IVEY BAY

Compared with the other five localities, this area is of no great importance since it supports only a meagre 46 species still living there today, let alone a very poor single valve of *Dosinia subrosea* which I found there, so worn that it could have been carried in from the Paremata region where the dredge was at work.

The tidal currents under the boatsheds can be quite dangerously powerful, but that may well suit some species that are found there, such as the "butterfly chiton" *Cryptoconchus porosus*, as well as *Calliostoma punctulatum*, *Penion sulcatus*, and the horse mussel *Atrina pectinata zelandica*. Anyone who wants to observe a live octopus in action can watch a resident one just out from the Ivey Bay footpath. I found a lair below low water mark out towards the last boatshed at the west of the bay, with empty shells surrounding its entrance. The owner of the lair drifted around, presumably sensing out live molluscs, but also jetted and drifted down down towards the boatsheds. Seeing this animal in action, I lost my initial enthusiasm for scrambling round waist deep in the water there!

The one really significant mollusc record from this site is the presence of *Perna canaliculus*, presumably seeded there from hull scrubbing operations by the local boat owners, since *Perna* was the more northern mussel until Marlborough Sounds mussel farmers began importing live spat from Kaitaia collected from Ahipara.

The subfossil records are all of the central and southern blue mussel illustrated in the older shell books as *Mytilus edulis aoteanus* Powell, 1958 but now to be known as *M. edulis galloprovincialis* Lamarck (according to Spencer & Willan 1996 following the genetic and morphological analyses of McDonald *et al.* 1991). Unlike *Perna* shells which are stronger and last longer, *Mytilus* shells disintegrate easily after the death of their inhabitant, so that these shells

do not survive in subfossil conditions well. *Atrina* shells are similarly quite fragile and degrade readily, giving no idea of their original size.

AREA 4 – GRAYS ROAD BEACH (Northern shore of the Inlet)

It took several years before I realised why there were two categories of dead shells, yet of the same species, in this bay. Some shells were reasonably fresh, whereas others could be dug out of the mud but were in advanced state of disintegration. Large heavily built *Cyclomactra ovata* were a clue, as they were in mud, yet contained fine sand with *Chemnitzia zelandica* in it. The final step was the accidental uncovering of two pairs, *in situ*, of *Panopea zelandica* but above the high tide line. From then on, the reason for these two categories of shells was apparent: one lot was subfossil, possibly indicating a catastrophic event such as an earthquake uplift.

Just across the road, from the culvert draining off the weak seepage area, is a seam of virtualy entire *Ruditapes largillierti*. Because of their height above the high tide level, perhaps two or more metres, they may well be Maori midden material rather than a subfossil bed similar to that in the Suction Dredge Area (2). The shells found about a metre or so above the stream where *Panopea zelandica* was common are certainly midden shells, lying amongst burnt oven stones.

The Wellington Shell Club's Field Day to Grays Road Beach in March 1968 was truly memorable as we had the great advantage of having two mollusc experts, Dr Winston Ponder and Dr Alan Beu, with us to help especially with the chitons and all the small species. The highlight for me was their using geological hammers to extract *Barnea* (*Anchomasa*) *similis* from the lowtide rocks, and showing us living *Arthritica crassiformis* attached symbiotically to the *Barnea* bodies, presumably for their protection. Mrs Jean Boswell and Mrs Betty Andrews travelled down from Wanganui specially for this outing, and thus, in return, began our fossil-hunting trips in to their area.

AREA 5 – KAPUNI GAS LINE, Pauatahanui section.

Over 30 years later the digging line is no longer visible, but "NO DIGGING" markers indicate where the pipeline was laid, only 2 two metres below the surface (MOW 1968, 1970). Had I had not been out of New Zealand, it would have been invaluable to have studied such cross-sections as the trench was revealing. Gorbey (1960) has related how he undertook archaeological salvage work, beginning on 15 March 1968, to survey sites likely to be affected by the trenching and to excavate what might be endangered or destroyed for ever. His report deals with circumstances in north and south Taranaki, but it seems apparent that time, energy, and funding could not keep pace with the progress of the earthdigging machinery. McFadgen (1970) gave an account of the problems of this 'fire brigade' type salvage archaeology, especially in the Kapuni situation where an 8 inch pipe, hence requiring only a narrow trench, was carried out over 407 miles at a remarkably rapid pace, So it seems that there was little time for anyone, archaeologist, geologist, or shell collector, to see what was being uncovered. So, in fact, had I been on the spot, trying to see, in its non-working hours, what the ditching machine had been cutting into, I might not have achieved anything! So far as I am aware no archaeological or geological searches were made along the Pauatahanui section of the line. A booklet published by the Ministry of Works in February 1970 provides an well-illustrated record of how the trenching was done, facts and figures about the pipeline, and the various organisations involved (MOW 1970).

By 29 October 1970 I decided that there was no further profit in continuing to visit the excavated area associated with the pipeline which I have already mentioned in my introduction, as by that time all the lumps of blue-grey sand thrown up had been dissolved by the rain. Patience in

allowing the rain to do the work had paid off since especially-fragile species such as *Scintillona zelandica* and *Dosinia greyi* were thus soaked out, the latter with their concentric shell rings unweathered. Slightly less fragile bivalves were *Dosinia lambata*, *Neilo australis*, and *Chlamys gemmulata*, but, again, these were deeper water species than can be collected from the shore. Usually my specimens of *Chlamys gemmulata* and *Pratulum pulchellum* have come from gutting stomachs of blue cod caught in 50 or so metres in the Marlborough Sounds! *Chlamys zelandiae* could be found in pairs, but *C. gemmulata* only as single valves. Perhaps their usual habit of hiding in sponges accounted for that.

I began tidily washing, inside and out, all the bivalves and gastropods until I found a perfect operculum *in situ* in an equally perfect *Penion sulcatus*. That operculum could be centuries old, if not millenia, and suggested that its owner had met a sudden death – yet not from another predator. Perhaps one of those earthquake uplifts had engulfed it along with its companions. Eventually some research worker will be glad to work on my ten trays of subfossil and recent material, so by not continuing washing them all I have been able to preserve their contained sediment and surrounding matrix, which may have future interest and significance.The gas line disturbance stretched for well over a mile from the northern (Paekakariki Hill Road) to the southern (Browns Bay Road) roads, but one variation occurred. Perhaps nine-tenths of that distance was blue-grey sand dug out in lumps by the trenching machine. The northernmost tenth, however, had light brown silt in patches, and inside the shells, which is one reason that I stopped washing them. The *Alcithoe arabica* shells in this silt area were also noticeably larger. There is a stream (with two species of *Potamopyrgus* in it) entering the harbour closeby the gasline, so presumably some cataclysm in the valleys brought down an unusual quantity of silt on top of the blue-grey sand at some later date, just as, perhaps centuries later, excavations in the developing Whitby subdivsions threatened the Inlet with a torrent of silt (cf. Kennedy-Good *et al.* 1975). McKnight (1969) documented a similar occurrence elsewhere in which a compact sand with a rich bivalve fauna was buried under a semi-fluid mud layer attributed to terrestrial runoff following heavy rainfall.

Although I have listed 110 species from Area 2 (Suction Dredge), the lesser total of 79 species from Area 5 (Kapuni Gasline) is nothing less than remarkable, given that ocean beach species such as *Bassina yatei* and *Zenatia acinaces* were living at one time within metres of the present Pauatahanui village at the head of the Inlet, a brackish-water area to-day which supports masses of the estuarine snail *Amphibola crenata* on the same spot. Area 5 total of 79 species might be one too many, since I see I've counted both species of the hydrobiid snail, i.e. *Potamopyrgus estuarinus* and *P. pupoides*. Both species exist alive to-day at the northern road end, but genuinely subfossil *P. estuarinus* appeared in the gasline sands, unless they had been washed in by floods. However, Barker (1980: 47) illustrated a subfossil *Potamopyrgus* sp. found in a 15-metre core taken in the middle of the Inlet, so I'll leave my two hydrobiid species in as a locality record.

The list below, giving the maximum sizes of sample species (like the effects of the suction dredge, the bigger the shell the bigger the chance of its getting smashed) provides some idea of the Kapuni gasline community so close to the eastern shoreline.

KAPUNI GASLINE SPECIES	Dimensions in millimetres
GASTROPODA	
Alcithoe arabica	120 x 48
Cominella adspersa	65 x 45
Penion sulcatus	111 x 44
Struthiolaria papulosa	83 x 46
BIVALVIA	
Barbatia novaezelandiae	53 x 32
Bassina yatei	53 x 41
Chlamys gemmulata	51 x 49
Chlamys zelandiae	32 x 30
Cyclomactra ovata	96 x 83
Dosinula zelandica	69 x 55
Austrovenus stutchburyi	73 x 59
Paphies australe	58 x 38
Ruditapes largillierti	51 x 38
Zenatia acinaces	67 x 30
Neilo australis	36 x 19
Tiostrea chilenis lutaria	68 x 60
Pratulum pulchellum	24 x 21

Neither stones nor larger rocks were recorded from the debris from the Kapuni trenchline, so bivalves requiring anchorage for their byssus threads were found to be few in number and small in size; perhaps the small numbers of *Mytilus* or the oysters anchored themselves on to *Atrina* individuals or large clumps of dead shells, and the same may be true for *Chlamys*. The rest of the bivalve species rely upon burrowing into mud or sand but the principal predator found in this assemblage, *Alcithoe arabica*, ploughs through the sediment after them, and *Cominella* , *Penion*, and *Struthiolaria* can do the same or skim over the surface for their prey.

Two exceptional bivalves were present in numbers: *Pecten novaezelandiae rakiura* Fleming, 1951, often considered the harbour-dwelling form of the common scallop, which by snapping its upper (flat) valve, can flee from approaching starfish in a series of jerky jet-like movements; the other is *Arthritica bifurca*, which was found only as single valves – its commensal host, the polychaete sandmason worm *Pectinaria australis*, with its tubes of sand, having long since disappeared. Powell (1979: 391) referred to *Arthritica bifurca* as "apparently always free living", but Wear's study published in 1966 on this species revealed its commensal relationship with *Pectinaria*, whose tubes are frequently confuse shell collectors as being some kind of tusk shell *Dentalium*.

Although the paired *Dosinia greyi* were a most welcome addition to my collection, the most desirable shells from the Kapuni gasline sands were *Neoguraleus amoenus*. One sturdy subfossil specimen occurred in the suction dredgings also. Powell's checklists and even the Spencer & Willan list give *N. amoenus* as known only from deep water and in the Aupourian zoogeographical province (northern New Zealand). I first collected it at Mahia Peninsula on 26 April 1969, but that locality is still a long way north of Pauatahanui Inlet.

There always has to be an "erratic", and in my case I personally collected a 5 inch strip of the thickened back lip of an adult paua, *Haliotis iris*. Even if there had been rocks there to live on, paua live only in areas of really turbulent waters, rather cold and wild. All I can assume from the shape of this fragment is that some ancient Maori accidentally dropped it overboard from his

waka, even before he had intended to make into the sparkling shank of a new kahawai lure. It certainly looks like that sort of thing.

Another "erratic" can now be recorded from Area 2. Bruce Hazelwood, then living at Otaki, and some friends were combing the suction dredgings when he found a single valve of *Fragum fragum*, the "strawberry Cockle", common in all Indo-Pacific waters. As it was in such a fresh condition, it did not appear to be a subfossil, but since many ocean-going yachts frequent the area, this shell could have been washed overboard from the scuppers after cleaning up from a trip to the Pacific. Who knows?

AREA 6 – PAUATAHANUI INLET

This includes the wider area of the Inlet as covered by the DSIR "Pauatahanui Environmental Programme (PEP) which "was set up in response to community concern about the effects of development in the catchment on the future well-being of Pauatahanui Inlet." This has been fully reported in the compilation "Pahatahanui – an environmental study" (Healy 1980)), still the basic reference work on the scientific knowledge of the area. Concern for the future of the of Pauatahanui Inlet still exists, with new threats such as the effects of a proposed new roading system through what is known as Transmission Gully. An important organisation which carries on the desire to know and protect the environment of this region, the Guardians of Pauatahanui Inlet, was set up in 1991 "to promote the recognition of the ecological, recreational and cultural values of Pauatahanui Inlet ... the only large estuarine wetland left in the lower half of the North Island and is at risk mainly from human activities in its catchment area." The Guardians carry out regular counts of the cockle population as an indicator of the health of the ecosystem, and also publish a regular newsletter. Their excellent educational resource kit written by Neil Bellingham has wide application for similar threatened region. Further information about the Guardians' activities can be obtained from their website – www.converge.org.nz/gopi/

Without going into all the geological background, which is quite extensive so far as publications are concerned, it can be noted here that Eiby's (1990) study of the historical tradition and geological evidence for changes in the Pauatahanui arms of Porirua Harbour about 1855, has cast considerable doubt on the long-held tradition that shoreline changes and levels were due to the effects of the West Wairarapa earthquake of 1855. He found no evidence for this, and attributed such changes to movements of the Ohariu Fault and the silting of the head of the inlet following clearance of the surrounding bush since early settlement. This conclusion serves to support my own, hitherto unsubstantiable, belief that there have been many small-scale uplifts over time. There is evidence that what is called the "Owhariu" Fault by Stevens (1974) and others may have moved 10 times or so over hundreds rather than thousands of years, with possibly a total displacement of 15 metres (50 feet) over the last 10, 000 years (Wellman 1956: 133). However, we still lack any more precise dates for such events.

So, what began for me in 1969 as a mere list of the subfossil shells uncovered by the Kapuni gasline trench just westward of the Pauatahanui village finally expanded into comments on other parts of the Inlet and its approaches. I can now hope that my 10 trays of evidence of molluscan happenings in earlier times can be passed on for someone to make a more in-depth analysis of how all this came to be.

ACKNOWLEDGEMENTS

Thanks to the Wellington Regional Council for use of their copyrighted map of the Pauatahanui Inlet Catchment as published by the Pauatahanui Inlet Advisory Group.

LIST OF SPECIES & THEIR COLLECTION SITES

KEY:			- [#X]	See "Notes"
Ngatitoa Domain	ND		Rec	Recent
Suction dredge	S/dr		Sub	Subfossil
Golden Gate boatsheds	GG		R	Rare
Greys Road, Camborne	Grey		C	Common
Kapuni Pipe line	Kap		UC	Uncommon
√ denotes a mention of the species in one of the articles in Healy, W.B. (Co-ord.) 1980 (*DSIR Information Series* 141); see Note "A" for details of authorship and content.	DSIR		Vc	Very rare

POLYPLACOPHORA	ND	S/dr	GG	Grey	Kap	DSIR
Leptochiton inquinatus (Reeve, 1847) - [#1]				Live		
Ischnochiton maorianus Iredale, 1914				Live		
Chiton (Amaurochiton) glaucus Gray, 1828			Live	Live		√
Sypharochiton pelliserpentis (Q. & G., 1835)			Live	Live	R	√
Onithochiton neglectus Rochebrune, 1881				Live		
Acanthochitona zelandica (Q. & G., 1835)				Live		
A. sp. [W.F.Ponder det. 16.3.1968]				Live		
A. (*Notoplax*) *mariae* (Webster, 1908)				Live	R	
Cryptoconchus porosus (Burrow, 1815)			Live			
GASTROPODA						
NACELLIDAE						
Cellana ornata (Dillwyn, 1817)			Live	Live		√
C. radians (Gmelin, 1791)		Sub		Live		√
C. stellifera (Gmelin, 1791)						
LOTTIIDAE						
Notoacmea elongata (Q. & G., 1834) - [#2]		Sub		Live		√
N. helmsi (E.A. Smith, 1894)		Rec	Live	Live	R	√
N. helmsi forma *scapha* (Suter, 1907)			Live	Live	R	√
HALIOTIDAE						
Haliotis iris Gmelin, 1791 - [#3]					R	
FISSURELLIDAE						
Scutus antipodes Montfort, 1810 - [#4]		Sub				
TROCHIDAE/Trochinae						
Cantharidella tesselata (A. Adams, 1851)		Rec				
Cantharidus (Mawhero) purpureus (Gmelin, 1791)		Sub				
Diloma arida (Finlay, 1926)		Rec	Live	Live	UC	
D. bicanaliculata lenior (Finlay, 1926)		Sub				
D. subrostrata (Gray, 1835) - [#5]		Rec	Live	Live	Vc	√
D. zelandica (Q. & G., 1834) - [#6]		Rec			UC	

TROCHIDAE/Trochinae - continued	ND	S/dr	GG	Grey	Kap	DSIR
Melagraphia aethiops (Gmelin, 1791)	UC	Rec	Live	Live	C	√
Micrelenchus (P.) rufozona (A. Adams, 1853)		Sub		Live		
M (M.) sanguineus (Gray, 1843)		Rec				
M. (M.) huttonii (E.A. Smith, 1876) - [#7]		Rec	Live	Live	UC	√
Trochus tiaratus Quoy & Gaimard, 1834		Sub		Dead	UC	
T. viridis Gmelin, 1791		Sub				
TROCHIDAE/Umboniidae						
Antisolarium egenum (Gould, 1849),		Sub		Dead		
Zethalia zelandica (H. & J., 1855)		Sub				
CALLIOSTOMATIDAE/Calliostomatinae						
Calliostoma pellucidum (Valenc.,1846)		Sub				
C. punctulatum (Martyn, 1784)		Sub	Live			
C. tigris (Gmelin, 1791)		Rec				
TURBINIDAE						
Cookia sulcata (Gmelin, 1791)		Rec				
Turbo smaragdus Gmelin, 1791 - [#8]	UC	Sub	Live	Live	C	√
BATILLARIIDAE						
Zeacumantus lutulentus (Kiener, 1841)		Sub	Live	Live	Vc	√
Z. subcarinatus (Sowerby, 1855)		Rec?	Live	Live	R	
MELANOPSIDAE						
Melanopsis trifasciata Gray, 1843		Rec				
TURRITELLIDAE						
Maoricolpus r. roseus (Q. & G., 1834)	R	Sub	Live	Live	Vc	√
Zeacolpus (Z.) vittatus (Hutton, 1873)		Sub				
Z. (Stiracolpus) delli Marwick, 1957	C	Sub				
LITTORINIDAE/Littorinae						
Nodilittorina cincta (Q. & G., 1833)				Live		
N. antipodum (Philippi, 1847)			Live	Live		
LITTORINIDAE/Lacuninae						
Risellopsis varia (Hutton, 1873)				Live		
EATONIELLIDAE						
Eatoniella (E.) limbata (Hutton, 1883)				Live	UC	
E. (E.) delli Ponder, 1965				Live		
ANABATHRIDAE						
Pisinna r. rekohuana (Powell, 1933) - #9]				Live		
RISSOIDAE						
Rissoina chathamensis (Hutton, 1873)		Sub				
HYDROBIIDAE						
Potamopyrgus sp.						√
P. estuarinus Winterbourn, 1971 - [#10]				Live	R	
P. pupoides Hutton, 1882 [stream nr gasline]					Vc/Rec	
VITRINELLIDAE						
Elachorbis subtatei (Suter, 1907)		Sub				
STRUTHIOLARIDAE						
Struthiolaria (S.) papulosa (Martyn, 1784)	R	Sub Rec	Rec	Rec	C	√

CALYPTRAEIDAE	ND	S/dr	GG	Grey	Kap	DSIR
Crepidula monoxyla (Lesson, 1831)	R	Rec	Live		C	
Sigapatella novaezelandiae (Lesson, 1831)		Sub	Rec	Rec	UC	
Zegalerus tenuis (Gray, 1867)	UC	Rec	Rec	Sub	Vc	
CAPULIDAE						
Trichosirius inornatus (Hutton, 1873)	UC	Sub		Rec	Vc	
NATICIDAE						
Tanea zelandica (Quoy & Gaimard, 1832)		Sub		Sub		
MURICIDAE/Muricinae						
Xymene ambiguus (Philippi, 1844) - [#11]		Sub/Rec	Live	Live	Vc	
X. aucklandicus (E.A. Smith, 1902)		Sub	Dead		UC	
X. plebeius (Hutton, 1873)	UC	Rec	Live	Live		√
X. pusillus (Suter, 1907) - [#12]		Sub/Rec			UC	
X. *traversi* (Hutton, 1873)		Sub/Rec	Live			
MURICIDAE/Ocenebrinae						
Haustrum haustorium (Gmelin, 1791)			Live			
Lepsiella scobina (Quoy & Gaimard, 1833)		Sub	Live	Live		
L. albomarginata (Deshayes, 1839)	UC	Sub	Live	Live	C	
MURICIDAE/Rapaninae						
Dicathais orbita (Gmelin, 1791)				Live		
BUCCINIDAE						
Austrofusus chathamensis Finlay, 1928		Sub				
A. glans (Röding, 1798)		Sub				
Buccinulum linea linea (Martyn, 1784)	UC	Sub	Live	Live	UC	
B. vittatum littorinoides (Reeve, 1846) - [#13] + *martensianum*, Greys Rd; Wolf, 1968-#14]	UC	Sub Sub		Live Live	Vc	
Cominella (C.) adspersa (Bruguière, 1789)		Sub		Live	Vc	√
C. (*Josepha*) *glandiformis* (Reeve, 1847)		Sub	Live	Live	Vc	√
C. (*J.*) *maculosa* (Martyn, 1784)		Sub		Live	UC	√
Penion sulcatus (Lamarck, 1816) - [#15]		Sub	Live	Live	Vc	√
BUCCINIDAE/Fasciolariinae						
Glaphyrina caudata (Quoy & Gaimard, 1833)		Sub				
COLUMBELLIDAE						
Paxula paxillus (Murdoch, 1905)				Live		
Zemitrella choava (Reeve, 1859)		Sub		Live		
VOLUTIDAE						
Alcithoe arabica (Gmelin, 1791)		Rec		Live	Vc	√
OLIVIDAE						
Amalda (*Baryspira*) *australis* (Sowerby, 1830)		Sub		Live	C	√
A. (*B.*) *depressa* (Sowerby, 1859)		Sub				
A. (*B.*) *mucronata* (Sowerby, 1830)	R	Sub			UC	
A. (*G.*) *novaezelandiae* Sow.,1859)		Sub	Dead		R	
COSTELARIIDAE						
Austromitra rubiginosa (Hutton, 1873)				Live		

CONIDAE	ND	S/dr	GG	Grey	Kap	DSIR
Neoguraleus amoenus (E.A. Smith, 1884)		Sub			R	
N. finlayi Powell, 1942	UC	Sub Rec		Dead	UC	
N. interruptus Powell, 1942	UC	Sub	Dead	Live	C	
N. sinclairi (Gillies, 1882)	UC	Sub		Live	UC	
TEREBRIDAE						
Pervicacia tristis (Deshayes, 1859)	R	Sub				
PYRAMIDELLIDAE/Odostomiinae						
Agatha georgiana (Hutton, 1885)		Sub				
Odostomia aff. *incidata* Suter, 1908		Sub				
PYRAMIDELLIDAE/Turbonillinae						
Chemnitzia zelandica Hutton, 1873				Sub		
CYLICHNIDAE						
Cylichna striata (Hutton, 1873)		Sub				
PHILINIDAE						
Philine auriformis Suter, 1909					R	
HAMINOEIDAE						
Haminoea zealandiae (Gray, 1843) [1½" gelatinous egg capsules on 16.3.1968]			Dead	Live	Rec	√
DORIDIDAE						
Archidoris wellingtonensis Abraham,1877) [on 16.3.1968; 8" wide egg-masses 11.6.1969]				Live		
Doriopsis flabellifera (Cheeseman, 1881)[#16]				Live		
ONCHIDIIDAE						
Onchidella nigricans (Q. &G., 1832) - [#17]				Live		
SIPHONARIIDAE						
Siphonaria australis Quoy & Gaimard, 1832 -[#18]		Fresh dead	Live	Live		
S. propria Jenkins, 1983	R	Sub				
AMPHIBOLIDAE						
Amphibola crenata (Gmelin, 1791)				Live	UC	√
ELLOBIIDAE						
Marinula filholi Hutton, 1878	R					
Ophicardelus costellaris (H.&Adams,1854)		Dead		Live	Rec	
BIVALVIA						
SOLEMYIDAE						
Solemya parkinsoni (E.A.Smith, 1874)		Live			R	
NUCULIDAE						
Nucula hartvigiana Pfeiffer, 1864	C	Live	Dead	Live	Vc	√
N. *nitidula* A. Adams, 1856	UC	Dead		Dead		
MALLETIIDAE						
Neilo australis (Quoy & Gaimard, 1835)					UC	
ARCIDAE						
Barbatia novaezealandiae E.A.Smith,1915)					R	

GLYCYMERIDIDAE/Glycmeridinae	ND	S/dr	GG	Grey	Kap	DSIR
Glycymeris modesta (Angas,1879)	R	Sub			R	
GLYCYMERIDIDAE/Melaxinaeinae						
Tucetona laticostata (Quoy & Gaimard, 1835)		Sub				
MYTILIDAE/Mytilinae						
Aulacomya atra maoriana (Iredale, 1915)			Live			
Mytilus edulis galloprovincialis Lamarck, 1818 - [#19]			Live	Live	UC	
Perna canaliculus (Gmelin, 1791)			Live			
Xenostrobus pulex (Lamarck, 1819)			Live	Live		
PINNIDAE						
Atrina pectinata zelandica (Gray, 1835)		Sub	Live		UC	
OSTREIDAE						
Crassostrea gigas (Thunberg, 1793) [noted by boatsheds, 4.7.1998]			Live			
Tiostrea chilensis lutaria (Hutton, 1873) [#20]	R	Sub	Live	Live	UC	
PECTINIDAE						
Chlamys gemmulata (Reeve, 1853)	R	Sub Rec			UC	
C. *zelandiae* (Gray, 1843)		Sub				
Mesopeplum convexum (Q. & G., 1835)		Sub				
Pecten novaezelandiae Reeve, 1853 [forma *rakiura fide* Beu in Marston, 1969]		Sub				
ANOMIIDAE						
Pododesmus zelandicus (Gray, 1843) - [#21]	UC			UC		
LUCINIDAE						
Divaricella huttoniana (Vanatta, 1901)		Sub Rec			R	
UNGULINIDAE						
Diplodonta (Zemysina) globus (Finlay, 1926)	R				UC	
D. (Zemysia) zelandica (Gray, 1835)		Sub				
LASAEIDAE/Lasaeinae						
Lasaea hinemoa Finlay, 1928				Live		
LASAEIDAE/Erycininae						
Arthritica bifurca (Webster, 1908)		Dead			C	
A. crassiformis Powell, 1933		Dead		Live	UC	
GALEOMMATIDAE						
Scintillona zelandica (Odhner, 1924)					R	
CARDITIDAE						
Pleuromeris zelandicus (Deshayes, 1854)		Sub				
Venericardia purpurata (Deshayes, 1854)		Sub				
CONDYLOCARDIIDAE						
Benthocardiella sp.		Sub				
CARDIIDAE						
Pratulum pulchellum (Gray, 1843) - [#22]	C	Sub			Vc	√

MACTRIDAE/Mactrinae	ND	S/dr	GG	Grey	Kap	DSIR
Cyclomactra ovata (Gray, 1843)	C			Sub Live	Vc	√
Oxyperas elongata (Quoy & Gaimard, 1835) - [#23]		Sub				
MACTRIDAE/Zenatiinae						
Zenatia acinaces (Quoy & Gaimard, 1835)	C	Sub Live		Sub	C	
MESODESMATIDAE						
Paphies australis (Gmelin, 1791) - [#24]	UC	Sub	Live	Live	C	√
TELLINIDAE						
Macomona liliana (Iredale, 1915)	C	Sub	Live	Live	C	√
Serratina charlottae (E.A. Smith, 1885)						√
Tellinota edgari (Iredale, 1915)	UC				Vc	√
PSAMMOBIIDAE						
Gari (*Gobraeus*) *stangeri* (Gray, 1843)	R	Sub		Dead		√
Gari (*Psammobia*) *lineolata* (Gray, 1835)				Dead		
SEMELIDAE						
Leptomya r. retiaria (Hutton, 1885)	UC	Live		Dead	UC	
VENERIDAE/Venerinae						
Dosina crebra (Hutton, 1873)		Sub				
Dosina zelandica Gray, 1835		Sub			UC	
VENERIDAE/Chioninae						
Austrovenus stutchburyi (Gray, 1828) - [#25]	UC	Sub	Live	Live	Vc	√
Bassina (*Callanaitis*) *yatei* (Gray, 1835)		Sub Rec		Sub	R	
Protothaca crassicosta (Deshayes, 1835)			Live	Dead		
Tawera spissa (Deshayes, 1835)		Sub				
VENERIDAE/Dosiniinae						
Dosinia (*Kereia*) *greyi* Zittel, 1864					UC	
D. (*Asa*) *lambata* (Gould, 1850)	UC				Vc	
D. (Phascosoma) *subrosea* (Gray, 1835)	UC	Sub	Dead		Vc	
VENERIDAE/Tapetinae						
Irus (*Notirus*) *reflexus* (Gray, 1843)					UC	
Ruditapes largillierti (Philippi, 1849) - [#26]	UC	Sub		Sub	C	
CORBULIDAE						
Corbula zelandica Q. & G., 1835 - [#27]		Sub			UC	
HIATELLIDAE						
Panopea smithae Powell, 1950 [see text notes herein]		Rec				
P. zelandica (Quoy & Gaimard, 1835) [see Marston, 1969, & text notes herein]					UC	
PHOLADIDAE						
Barnea (*Anchomasa*) *similis* (Gray, 1835)		Sub		Live		
TEREDINIDAE						
"*Teredo*" sp. [very large and heavy] - [#28]		Sub		Sub	C	

BIVALVIA continued ...MYOCHAMIDAE	ND	S/dr	GG	Grey	Kap	DSIR
Myadora antipodum E.A. Smith, 1880	Vc					
M. striata (Quoy & Gaimard, 1835)	C	Sub Rec		Live	R	
CEPHALOPODA						
Octopus sp. [hunting molluscs from its burrow, Iveys Bay, Paremata boatsheds on 30.6.1998]				Live		

NOTES	
A	Although details have been given on pp 10-11 in Healy's co-ordinated volume of the DSIR project at Pauatahanui (Healy 1980) of the scientists who "carried out the research projects and contributed to the material in this book", individual authorships of the sections which they wrote were not specifically attributed. However, the names of the ten members of the N.Z. Oceanographic Institute who made individual contributions (though not discernible in the book as such) can be ascertained from pp 62-63 in Rose-Marie Thompson's compilation of the Institute's publications from 1954 to 1986 (Thompson 1987). Those of direct relevance to the present article are: I.N. Estcourt, K.R. Grange, and J.R. Richardson. The titles of their sections are listed under the authors' names in the "Background Information and Reference Sources" provided by Elliot Dawson . The molluscan species mentioned by these authors are indicated in my Species List by √, and the individual page numbers can be found in the following table.
#1	As *Terenochiton* in Marston 1968a,b
#2	As *Notoacmea daedala* in Marston 1968b
#3	Not a natural occurrence – see note in my text
#4	As *Scutus breviculus* in Marston 1968b
#5	As *Zediloma corrosa* in Wolf 1968, Marston 1968a,b
#6	As *Zediloma atrovirens* in Marston 1968b
#7	= *Micrelenchus tenebrosus* (A.Adams, 1853), cf. Marshall 1998: 126-129
#8	As *Lunella* in Marston 1968a,b
#9	As *Estea* in Marston 1968b
#10	As *Potamopyrgus antipodum* [*sic*] (=*antipodarum*) in Marston,1968a,b
#11	As *Zeatrophon* in Marston 1968b
#12	As *Axymene corticatus* in Marston 1968b
#13	As *Buccinulum multilineum* in Wolf 1968, Marston 1968a,b
#14	As *Buccinulum littorinoides* in Marston 1968b; Wolf 1968 as *Buccinulum martensianus*
#15	As *Penion adusta* in Wolf 1968, Marston 1968b, *Penion adspersa* in Marston 1968a, *P. mandarina* in Marston 1968b, *P. adjustus* in Estcourt 1980
#16	As *Ctenodoris* in Marston 1968a, b
#17	As *Onchidella patelloides* in Marston 1968a, b
#18	As *Siphonaria zealandica* in Marston 1968a, b
#19	As *Mytilus edulis aoteanus* in Marston 1968b
#20	As *Ostrea lutaria* in Marston 1968b
#21	As *Monia* in Marston 1968b
#22	Formerly *Nemocardium* – see Powell 1979
#23	Formerly *Mactra* – see Powell 1979
#24	As *Amphidesma australe* in Wolf 1968, Marston 1968b
#25	As *Chione* in Wolf 1968, Marston 1968b, Richardson *et al.*, 1979, Barker 1980, Grange 1980, Richardson 1980
#26	As *Paphirus* in Marston 1968b
#27	As *Notocorbula* in Marston 1968b
#28	*Teredo antarcticus* in Marston 1968b, but see Powell 1979: 431

SPECIES MENTIONED IN HEALY 1980, *DSIR INFORMATION SERIES* 141
(*i.e.* Barker [B], Estcourt [E], Grange [G], and Richardson [R].)

Name in original text	B	E	G	R	Current name [*i.e.* Spencer & Willan]
Amaurochiton glaucus			142		*Chiton (Amaurochtion) glaucus*
Sypharochiton pelliserpentis			142		*Sypharochiton pelliserpentis*
Cellana ornata			142		*Cellana ornata*
C. radians			142		*Cellana radians*
Notoacmea daedala			112		*Notoacmea elongata*
N. elongata		112			*N. elongata*
N. helmsi			110,142 Fig. 56		*N. helmsi*
N. helmsi forma *scapha*			110		*N. helmsi* forma *scapha*
Diloma subrostrata			108,110 Fig. 56		*Diloma subrostrata*
Melagraphia aethiops			112		*Melagraphia aethiops*
Micrelenchus huttoni			142		*Micrelenchus tenebrosus*
Micrelenchus tenebrosus			110		*M. tenebrosus*
Trochus viridis			142		*Trochus viridis*
Lunella smaragdus			112.142		*Turbo smaragdus*
Zeacumantus lutulentus			109,110 Fig. 56		*Zeacumantus lutulentus*
Melanopsis trifasciatus	Fig. 23				*Melanopsis trifasciatus*
Maoricolpus roseus		113			*Maoricolpus r. roseus*
Potamopyrgus sp.	Fig. 23				
Struthiolaria papulosa	Fig. 23				*Struthiolaria (S.) papulosa*
Xymene plebeius		113	110,142		*Xymene plebeius*
Cominella adspersa			110.142		*Cominella adspersa*
C. glandiformis			108,110 142, Fig. 56		*Cominella glandiformis*
Penion adjusta [*sic*]		113			*Penion sulcatus*
Alcithoe arabica		113			*Alcithoe arabica*
Baryspira australis		113,114			*Amalda (Baryspira) australis*
Haminoea zelandiae			110		*Haminoea zelandiae*
Amphibola crenata			110		*Amphibola crenata*
Nucula hartvigiana		114, Table 15	108,110 142, Fig. 56		*Nucula hartvigiana*
Nemocardium pulchellum	Fig. 23				*Pratulum pulchellum*
Mactra (Cyclomactra) ovata *Cyclomactra ovata*		113	 142		*Cyclomactra ovata*
Paphies australis			110		*Paphies australis*
Tellina liliana [in Fig.57 as "*Tellina macomona*"!] *Macomona liliana*		 113	110 Figs 56 & 57		*Macomona liliana*
Angulus edgari	Fig. 23				*Tellinota edgari*
Tellinella charlottae	Fig. 23				*Serratina charlottae*
Gari stangeri		113			*Gari stangeri*
Chione stutchburyi	Fig. 23		109, Fig. 56	115-117	*Austrovenus stutchburyi*

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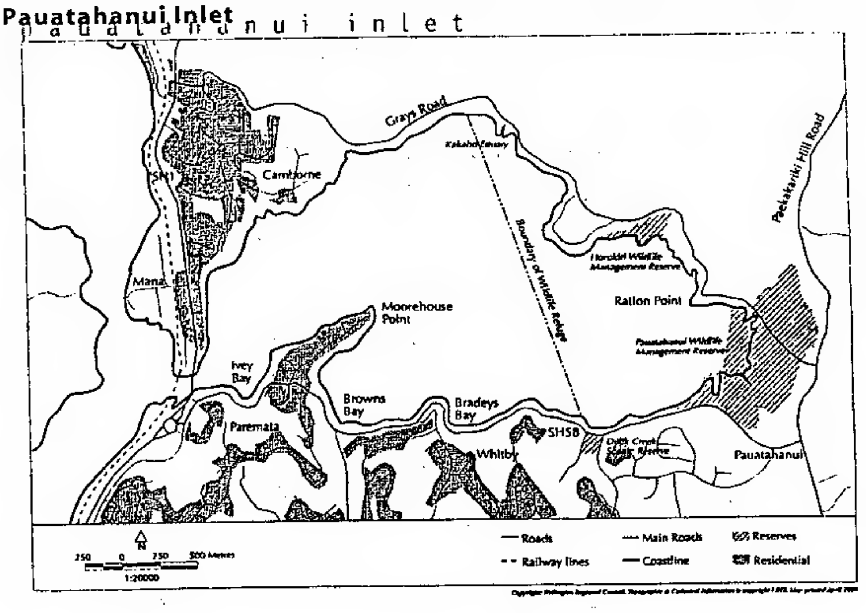

PAUATAHANUI INLET: NATURAL & HUMAN HISTORY – BACKGROUND INFORMATION & REFERENCE SOURCES[1]

[with some annotations, mainly on molluscan matters]

By Elliot Dawson

The shellfish of the Pauatahanui Inlet form a dominant part of the total ecosystem of this nationally significant locality. Not only are they an integral part of its food web and have interesting life histories and habitat associations, but they were, also, a source of nutrition, *kai moana*, for the indigenous inhabitants of this region, and, to-day, are still a resource to be protected and further studied. Our Wellington Shell Club, indeed, has a role to play in this by providing specialised knowledge and taxonomic expertise in identification.

The Guardians of Pauatahanui Inlet have set the scene well for a new and deeper appreciation of the role of these molluscs in their admirable educational resource kit written by Neil Bellingham, in which practical suggestions are detailed of further studies that could be undertaken, particularly at various school levels. Tomorrow's generations will be grateful for this stimulus if the Guardians' challenges are taken up.

As a background to John Marston's report on the molluscs of the Pauatahanui Inlet (and the Paremata Flat), present and past, I offer some background information sources which, in themselves, may provide a further stimulus not only to further work on the Mollusca and their environment, both natural and human-influenced, but to the many other aspects of one of the most important *taonga* of the greater Wellington region. The list is certainly not exhaustive but should lead the way to new interests.

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[See pp 11-12 and footnote on p. 12 re. Paremata pa.]

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[See especially plate 48.]

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[See particularly p. 247.]

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[Describes Pauatahanui Inlet as an inland arm of the sea formed when a river valley was drowned by the rise of sea level at the end of the last Pleistocene glaciation. "Shellmiddens on the shoreline and hills around the harbor mark the sites of old cultivation grounds and temporary hunting and gathering camps used by the Maori in prehistbric times"; "^{14}C dates for shells of the harbor bivalve *Austrovenus stutchburyi* ... and the open coast, rocky shore gastropod *Haliotis iris* ... indicate that the middens were deposited between 375 and 465 ... BP ..."]

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[Mention of *Macomona liliana* and *Amphibola crenata* and their habitats.]

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[Molluscs illustrated in Figure 23 from an undisturbed 15-metre core at Station 11 in the middle of the Inlet between Rat Point and Duck Creek (see Fig. 21, p. 45.]

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[Includes, p. 215, species list of shells from "The Taupo (Plimmerton) midden" which "may be seen on the eastern side of the railroad, between the station and Tawhiti-kuri (the rocky bluff south of the station), which is composed of the refuse from a hamlet that was situated on the hillside. At this place *Chione stutchburyi* is found in the greatest number, obtained from the adjacent sandy beach, the *tahuna pipi*, or "*pipi* bank," as early settlers termed such cockle-bearing

sands. In the following list of shells found in this midden the species are so arranged that those found in greatest number occupy the first place ...down to the small *Turritella* and *Monodonta*, of which very few were found ..."]

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[Report of the results of salvage excavations carried out in December 1962 on the Ngatitoa Domain (N.Z. Archaeological Association site N160/50); details of historical background, stratigraphy, burials, radiocarbon dating, composition of middens (including list of mollusc species, noting that the "overwhelming importance of *Chione stutchburyi* in all samples is clear, although it is evident that other mollusc species, particularly *Paphies australe*, were consistently more common in layer 3 than in layer 2" – see also Tables 2 & 3), diet ("... shellfish must be regarded as important throughout"), artifacts, sequence of occupation, species lists of bird and mammal bones, value of "salvage" excavation, assessment of methods.]

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[Report of work in September 1959 by the Wellington Regional Group of the New Zealand Archaeological Association.]

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[P. 260, note of bones of small Kaka "in loose shell and pumice sand below a late Maori midden near Walker's Hill, Porirua Harbour" found with J.C. Yaldwyn in February 1951.]

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[Material collected by Augustus Hamilton at Paremata.]

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[Discussion of the identification and significance of bones of the Kakapo *Strigops habroptilus* collected by Augustus Hamilton, Director of the Dominion Museum from 1903 to 1913, "in the notorious Rauparaha's Kitchen-middens" at Paremata, and suggestions as to their probable location.]

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[Mr W.H. Field (Otaki) asked in the House of Representatives for protection of the old fort at Paremata.]

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[Re. Pauatahanui village.]

DOMINION, 1997: Getting Away -Historic battle site close yet remains unspoiled. *The Dominion* (Wellington) 9 January 1997: 12, 1 map.

DSIR, 1972: *Report on the Scope and Feasibility of a scientific Investigation of Pauatahanui Inlet, Wellington.* 8 pp.
[Presented to the Minister of Science and Technology (Hon. W.F. Birch) in November 1972 and resulting in the implementation of the Pauatahanui Environmental Programme (PEP), susequently fully reported in Healy (Co-ord.) 1980, *q.v.*]

DSIR, 1980 - See Healy 1980 ...

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[Sampling at 20 sites revealing numbers, distribution patterns and seasonal variation. Species of molluscs found associated with high current velocity and coarse sediments included "the snails *Maoricolpus roseus*, *Penion adjustus* [*sic*], and *Alcithoe arabica*; and the bivalve *Gari stangeri*." Species associated with sandy sediments included "the snail *Baryspira australis*." Species associated with low current velocity and muddy sediments included *Xymene plebeius*, *Nucula hartvigiana*, *Mactra* (*Cyclomactra*) *ovata*, and *Macomona liliana*, of which the most abundant was *Nucula hartvigiana* with a maximum density of 156 per square metre (see Table 15).]

EVENING POST, 1960: Major setback after year of painstaking spare-time effort. *The Evening Post* (Wellington) 25 February 1960: -, 1 photo.
[Damage to conservation efforts made on the old Paremata fort, photograph of fort with Sue Davis of the Dominion Museum and John Pascoe, Secretary of the Historic Places Trust; see also article in the *Dominion* about this time "Vandals threaten historic excavation at Paremata.]

EVENING POST, 1963: Area was used for sport at the turn of the century. *The Evening Post* (Wellington) 14 September 1963: - .
[History of the Ngatitoa Domain from notes by Dorothy McKenzie of Lower Hutt, original European owner being James Walker, commemorated in Walker's Point, once noted for its oysters.]

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[Porirua Harbour as an example of mud-flats fauna, in which the "dominant molluscs are the bivalves, *Austrovenus stutchburyi* and *Macocoma* [*sic*] *liliana*."]

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GRANGE, K.R. 1980a: Intertidal biology. Pp 109-112, figs 56-57 **in**: Healy (1980), *q.v.*
[Recognition of the common species in the Pauatahanui Inlet and their ecological communities and feeding methods; 37 different animal species were identified although only 13 were common enough to occur at 40% of the sampling sites. *Chione stutchburyi* was the most abundant and widespread species. Some of the common molluscs are illustrated in his Figure 56: *Nucula hartvigiana*, *Chione stutchburyi*, *Cominella* [as "*Corninella*"] *glandiformis*, *Zeacumantus lutulentus*, *Notoacmea helmsi*, *Diloma subrostrata subrostrata*, and *Tellina liliana*.].

GRANGE, K.R. 1980b: The food web. Pp 139-142 fig. 64 **in**: Healy (1980), *q.v.*
[Discusses marine plant detritus, salt-marsh vegetation, and the food web in which the various kinds of molluscs living in the Inlet play a role carnivores (*Cominella*, *Xymene*), herbivores (*Micrelenchus*, *Trochus*, *Notoacmea*, *Cellana*, *Lunella*, and chitons), deposit feeders (*Amphibola*, *Zeacumantus*, *Macomona*, *Nucula*), and suspension feeders (*Cyclomactra*).]

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GUARDIANS OF PAUATAHANUI INLET INC., 1998: *Pauatahanui Inlet – a living resource.* Wellington: Guardians of Pauatahanui Inlet Incorporated [available from Education Support Consultants, Wellington), $15.00].
[An educational resource including poster, pamphlets (e.g. *Action Pauatahanui Inlet*, published by the Guardians of Pauatahanui Inlet, August 1988, *Pauatahanui Wildlife Reserve*, DOC.), and 5 booklets by Neil Bellingham: **1.** Land, sea and People. Geological and historical background. Pp 1.1-1.24, illus.; **2.** Life on the mud flats. Primary science at levels 1-3. Pp 2.1-2.24, illus. [includes, p. 2.19, "Investigating the cockle"; p.2.20, "Cockle cards: how cockles feed"; p. 2.21, "Comparing shellfish of the mud flats", wedge shell, cockle, pipi; questions and ideas for projects, useful illustrations etc.]; **3**: The estuary shore. Intermediate and lower secondary science at levels 4-5. Pp 3.1-3.28, illus. [includes "Cockle studies", pp 3.18-3.24, "Detective work on the New Zealand cockle", "Cockles in the food web", "The New Zealand cockle (tuangi)", "Cockle cards I: How cockles burrow in the sand (and matches)", "Cockle cards II: Adaptations that ensure survival (barrier exercise)", questions and ideas for useful projects]; **4.** Ecological studies. For senior secondary science and biology at levels 6-8. Pp 4.1-4.36; **5.** Teachers' Guide. A planning and reference guide. Pp 5.1-5.24; briefly reviewed by Judith Sidaway in *New Zealand Science Monthly* November 1998.]

GUARDIANS OF PAUATAHANUI INLET, 1999: November cockle count results. April 1999 [*Newsletter*]: 1.
[Report from Ken Grange of NIWA – adult population of cockles much the same as in previous surveys but still less than half the population measured in 1976; increase in juvenile populations, now 7% of the total population compared with only 1% in 1992. They are considered to be at risk from siltation and over-harvest.]

GUARDIANS OF PAUATAHANUI INLET, 2000: Cockles near Mana Esplanade in poor shape. September 2000 [*Newsletter*]: 1.
[Report from Mike Hine of NIWA on cockles studied 50 metres out from the Brandon Estate and near the boatsheds off Mana Esplanade, found to be in very poor condition with gills and gut inflamed, consistent with contamination by polyaromatic hydrocarbons, probably entering the inlet from road run-off.]

GUARDIANS OF PAUATAHANUI INLET INC., 2000: *Fact Sheet* 1. The cockle story. 3pp, 1 fig.
[Report of results of surveys in 1976, 1992, 1995, and 1998, showing "an alarming decrease" in cockle numbers between 1975 and 1995, the latter density being one third of that found in 1976. Adult cockle population in 1998 was almost the same as in 1995 although there was a total greater total number due to an increase in juvenile cockles less than a year old (i.e. < 10mm in width), juveniles being about 7% of the total cockle population (compared with only 1% in 1992). Possible causes of cockle decline are suggested. "What remains to be seen is whether the Inlet is in a healthy enough state to allow these juveniles to grow to maturity and reverse the downward trend in cockle numbers." Another census was scheduled for Sunday 4th November 2001- see report by Hansford 2001.]

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[See particularly p. 181.]

HANSFORD, D. 2001: Fears for inlet's health rise as cockle numbers dwindle. *The Dominion* (Wellington) 20 November 2001: 5, I fig.
[Results of survey, in November 2001, by the Guardians of Pauatahanui Inlet found that cockles, "regarded as reliable indicators of ecological health, are in serious decline in the Inlet. Survey coordinator Neil Bellingham said "numbers of

the molluscs had dropped well below half the numbers found in a 1976 survey." The decline had serious implications for wildlife, he said." Possible reasons suggested were pollution from nearby Mana, notably hydrocarbons and materials from car brake pads getting into the water, and runoff from fertilisers encouraging growth of sea lettuce, and also the disappearance of eel grass, part of the foodchain of the cockle.

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[*Alcithoe arabica, Panope zelandica, Pecten novaezelandiae rakiura,* found from Kapuni pipe line excavations, first visited on 15 March 1969; "The other shells are typical of the estuary: *Amphibola,* pipi, cockle, *Cominella adspersa, C. glandiformis,* and ... *Cyclomactra ovata* etc."]

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[Also includes views across Pauatahanui Inlet in 1973 and "Today's" in article on the Whitby Community Development Consortium.]

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[A "Bottle nose" about 25 feet long from Porirua Harbour for deposit in the Colonial Museum.]

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[An early attempt at aquaculture by a Mr Jenkins.]

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["This pamphlet was edited with the permission of Chris Pugsley [*q.v.*] from articles published in New Zealand Defence Quarterly Nos 6 and 7, 1974."]

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[Includes 6 new species from Pauatahanui Inlet, descriptions and ecology, *Enhydrosma variable*, *Halectinosoma hydrofuge*, *H. otukoua*, *Paralaophone aenigmaticum*, *Parastenhelia megarostrum*, *Quinquelaophonte candelabrum*; also *Mesochra parva* J.M. *Thomson*, *Robertsonia propinqua* (T. Scott), a species of *Halicyclops*, and an undescribed species of *Brianoia*.]

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[1] Although this list is ostensibly restricted to the Pauatahanui Inlet, some references are also related to the entrance to Porirua Harbour, the Ngatitoa Domain area, and the Porirua arm of the harbour, the "surrounding area" in Yarrall's (1974) terminology - see also NZOI charts.]

"The name Pauatahanui was originally applied only to the stream immediately south of the hill on which Rangihaeta established the Matai-taua pa, where the cemetery of St Alban's church now stands. Pronunciation and orthography have presented Europeans with more than usual difficulty, and Elsdon Best (1914) records no fewer than 18 variants of the spelling ... He considers that it should be spelled as three separate words, but consistently hyphenates. New Zealand company maps have Pa-wai-tangi-nui, and Pawa-tangi-nui is also common, but the most consistent form throughout the history of the settlement has been Pauhautanui. This form was in use by the post office, by map-makers, and by the law reports until the recent decrees of the Honorary Geographic Board. It is the only form used by older residents, and the spoken form universally current (see Brodie, 1980). Best could find no tradition of how it was named.

"Use of the description Pauatahanui Inlet to distinguish it from the Porirua Inlet (or Arm), though logical and convenient, seems to be quite recent introduction, and is not be found in early sources. Only McKillop [1849] seems to have found it necessary to make the distinction, and it calls it "the creek", a standard English usage for an estuary that tends to surprise New Zealanders." Eiby 1990: 246.

LOCAL SHELLS IN BALAENA BAY, WELLINGTON HARBOUR

By Jill Burnet

A couple of weeks ago, Jenny Raven handed me a copy of the list we had made of the shells collected on an outing to Balaena Bay, asked me to write it up for *Cookia*. The date on the list is 21 March 1999, and it is now November 2001, so my recollections of the day are somewhat hazy, but I do recall that it was a fine sunny day, a good low tide, and that we explored the shoreline from Balaena Bay to Point Jerningham, further round towards the city. Jenny, as always, was the one who got out into the water, looked under rocks, and got wet; I wandered along the edge, poked about in rock pools, and scribbled down what we saw. We found the following species living in the area:

GASTROPODA	
Cellana ornata	Very common
Cellana radians	Very common
Notoacmea helmsi	Common
Patelloida corticata	One only
Haliotis iris	Few
Diloma zelandica	Common
Melagraphia aethiops	
Turbo smaragdus	
Zeacumantus subcarinatus	
Nodilittorina antipodum	
Haustrum haustorium	
Buccinulum vittatum	
Cominella maculosa	Very common
Cominella virgata	Very common
Siphonaria australis	
BIVALVIA	
Aulacomya atra maorina	Very common
Mytilus edulis galloprovincialis	Very common
Perna canaliculus	Few
Paphies australis	
Tawera spissa	

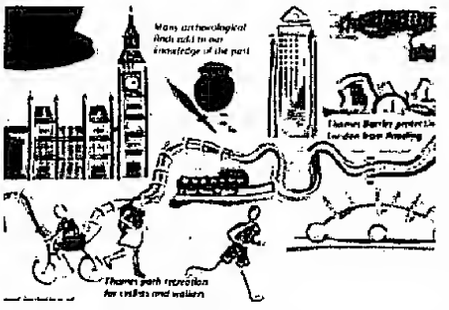
We were particularly pleased to be able to find the paua *Haliotis iris*. There were only a few, but they were of large size. The specimens of *Cominella maculosa* had a nice colour and they and *C. virgata* were a good size. On the other hand, *Turbo smaragdus* and *Haustrum haustorium* were small. As dead shells, we noted the following species:
Gastropoda – *Maoricolpus roseus* and *Lepsithais lacunosus*; **Bivalvia** – Pecten novaezelandiae, *Pseudarcopagia disculus*, Soletellina nitida, *Gari stangeri*, *Austrovenus stuchburyi*, and *Ruditapes largillierti*. That makes a total of 28 species recorded on that day. There was also a solitary *Xymene*, but we didn't get a more specific identification for it.

And the point of my title ?

Well, back in 1965, John Marston found some 'foreigners' in this same area. He wrote a paragraph about it, which you can find on the last page of our *Bulletin* 29. Jenny and I didn't find anything exotic, but we were still happy with the results of our afternoon's walk.

THAMES TREASURES

By Judy Hardie



The River Thames, flowing through the centre of London, England, is one of the most famous rivers in the world. Visitors from all over the world come to examine the historic sites along its bank, to take cruises on its waters and examine the historical docks. Streams, canals and drains pour their contents into it with disastrous results.
In recent years conservation measures have restored the once grossly polluted Thames to such a degree that it now supports a significant fish population – over 118 species having returned to the river where in the 1950s only eels could survive at certain times of the year. From the open sea to Teddington, the Thames is tidal, and along with the fish the invertebrate population has boomed in the rocks and crevices of river walls. Among the native Crustacea and Mollusca have come others imported accidentally by ships from round the world. The American Slipper Limpet *Crepidula fornicata,* in the commercial oyster beds of the outer estuary since 1880 is now a pest. The Chinese Mitten Crab *Eriocheir sinensis* is now established and causing erosion difficulties as it burrows into the mud of the river bank.

Once last year, on a weekend in September, the river authorities closed the Thames barrier, a flood control barrier spanning the 520 metre wide Woolwich Reach. Although this barrier is normally only closed on occasions when flooding from the North Sea is likely to affect parts of London, the action taken in summer enabled many to walk the actual riverbed banks of the Thames and explore the river from a very different perspective. It was in the course of this day that Liz, my daughter remembered her mother's constant need of shells, and set out with collecting bags to see what might be found! On her return home for Christmas her suitcase contained these treasures gleaned from among the mud and stones of the river:

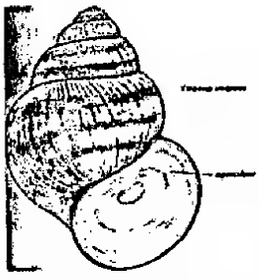
The Common Periwinkle
Littorina littorea

A favourite food for many, were the shells from live specimen living there, or had they been washed down drains from merchants' stalls in other parts of the city? Were they eaten on the spot and shells tossed into the water? We cannot tell.

Common Whelk
Buccinum undatum
This creature prefers to live on stony or sandy beds so possibly is not a native of this part of the river. As another favoured edible shellfish large quantities are sold each day and the shells probably dumped.

Also found in quantity were the **Dog Whelk,** *Nucella lapillus,* and the **Netted Whelk,** *Nassarius reticulates.* Two examples of the **Common Wentletrap,** *Clatharus clatharus* were in the collection.

Empty shells of yet another edible species were abundant – that of *Ocenebra erinacea* or **Sting Winkle.** A predator, its chief victims are bivalves. It is common on all hard sea bottoms and jetties, preferring shallower depths.



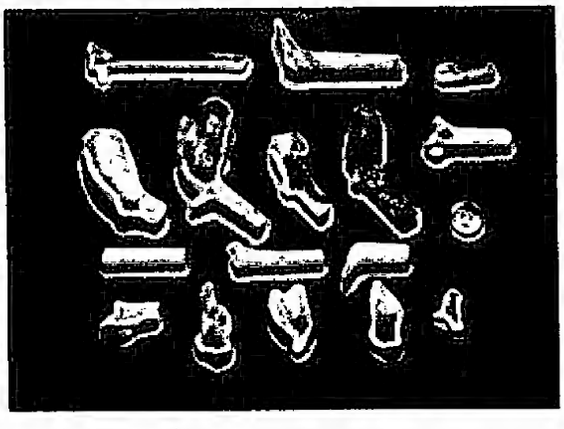
The remaining gastropod shells were probably washed downstream from above Teddington – freshwater snails, *Viviparus viviparus,* one of the largest and best known of the operculate type of freshwater snail, and *Viviparus conectus* [*V. fasciatus*], with a thinner and shinier shell than that of *V. viviparus.*

Four bivalve examples were found. Most of the shells were heavily eroded and could have been washed around for many, many years. More recent specimen of *Unio tumidus* or **Swollen River Mussel,** a hardwater species living in slow rivers and canals were found. There were good examples too of *Mytilus edulis*, a common edible mussel widely distributed in estuaries and on rocky coasts throughout the British Isles.

The **Common Cockle,** *Cerastoderma edule* occurs in large numbers in the shallow waters of lagoons and estuaries, so it was no surprise to find these shells on the river bank.

Further smaller gastropods still need definite identification. Among them appear several *Physa fontinalis*, commonly found in moving water and clear streams throughout the British Isles, and *Hydrobia ulvae* which is commonly found feeding on algae or detritus in estuaries and salt marshes. It can commonly be seen in abundant numbers on mud flats, giving the surface a granular appearance. *Theodoxus fluviatilis* could also be identified. It favours hard water and lives in stones and under bridges, widely distributed in England, except in Devon or Cornwall.

And more treasures :



Along with shells came fragments of clay pipes. There was a mixture between older pre-1700 flat-based bowls and typical 1800-1840 period. The stem on the upper row shows the makers initials. The older fragments (centre row) have a characteristic line across the top of the bowl and look about a 1650 date. The decorated one is around 1750-1800 and is a typical regimental emblem, a common occurring theme. During the Napoleonic period the design with the Prince of Wales feathers was seen, but these pipes were usually more pointed at the heel. Thanks to Elliot Dawson for the digital photograph and identifying e pipes. Teeth, with a beautiful antique patina, were kindly identified by Dr Ian Smith of Otago University as from an ancient cow (possibly the remains of a medieval banquet?) – and there's an old button too.

Thames treasures indeed!

MOLLUSCS FOUND ON THE WRECKAGE OF THE INTERISLAND STEAMER EXPRESS t.e.v. "WAHINE" IN 1973

By E.Y. WOLF

[*Editor's note*: Several of our members collected molluscs from the wreckage brought ashore from the interisland steamer express t.e.v. *Wahine* which was tragically wrecked on 10 April 1968 at the entrance to Wellington Harbour with a loss of 51 lives. Salvage of the remains of the ship occupied several years during which time various pieces of its structure were deposited on a Wellington wharf, giving an opportunity, incidentally, for shell collectors to retrieve or study organisms on it. I myself photographed and measured the zonation of fouling organisms, such as barnacles and mussels, which had settled on the bridge which had been lying in a vertical position since the ship foundered and was brought ashore by the Harbour boar's crane Hikitea on Tuesday, 12 November 1968, giving interesting information on the organisms' growth rates over a finite period. This list of shells identified in September and October 1973 (see M.A. Wotton 1974, WSC *Bulletin* 34) gives a perhaps surprising total of 83 species. Other members may now be stimulated to dig out their notebooks and specimens to see if they can provide any further information on this curious habitat which we had the privilege of examining. Further information about this disaster can be found in – Cockcroft, A.N. 1970: The anatomy of a casualty – the loss of the Wahine. *Marine Observer* 40 (229): 114-119; Lambert, M. & Hartley, J. 1974; *The 'Wahine' Disaster*. Auckland/London: Collins/Fontana Silver Fern. 222p. (1st ed. 1969, A.H. & A.W. Reed, Wellington); Ingram, C.W.N. 1977: *New Zealand Shipwrecks 1795-1975*. 5th ed. Wellington: A.H. & A.W. Reed. 464 p.; *Wahine* bridge comes ashore. *The Evening Post* 12 Nov. 1968; The Waitomo cave look in *Wahine*'s bridge/Bridge of *Wahine* fouled and rotting. *The Evening Post* 13 Nov. 1968, p. 18, photographs of bridge etc.]

MOLLUSCA IDENTIFIED FROM THE WRECKAGE OF THE *WAHINE* IN 1973
POLYPLACOPHORA
Family ACANTHOCHITONIDAE
Cryptoconchus porosus (Burrow, 1815)

GASTROPODA	
Family HALIOTIDAE	Family BARLEEIDAE
Haliotis iris	*Fictonoba carnosa*
Family TROCHIDAE/Trochinae	*Rissoina rufolactea*
Calliostoma (Maurea) punctulatum	Family RISSOIDAE
Cantharidus purpuratus	*Rissoina chathamensis*
Micrelenchus dilatatus	*R. zonata*
M. micans	Family CALYPTRAEIDAE
Trochus (Coelotrochus) tiaratus	*Maoricrypta monoxyla*
Antisolarium egenum	*Sigapatella novaezelandiae*
Family TURRITELLIDAE	*Zegalerus tenuis*
Maoricolpus roseus roseus	Family NATICIDAE
Zeacolpus (Zeacolpus) vittatus	*Tanea zelandica*
Z. (Stiracolpus) delli	Family MURICIDAE
Family LITTORINDAE	*Xymene ambiguus*
Melaraphe cincta	*X. pusilla*
Family BUCCINIDAE	Family MARGINELIDAE
Buccinulum linea linea	*Volvarinella cairoma*
Cominella (Cominella) adspersa	*Volvarinella subfusula*
C (C.) maculosa	Family COSTELLARIIDAE
C. (Josepha) quoyana quoyana	*Austromitra rubiginosa*
Penion sulcatus	

Family COLUMBELLIDAE	Family CONIDAE
Zemitrella choava	*Phenatoma zealandica*
Z. laevigata laevigata	Family TEREBRIDAE
Family VOLUTIDAE	*Pervicacia tristis*
Alcithoe arabica	Family PYRAMIDELLIDAE
Family OLIVIDAE	*Agatha georgiana*
Amalda (Baryspira) australis	*Chemnitzia zealandica*
A. (B.) mucronata	Family SIPHONARIIDAE
A. *(Gracilispira) novaezelandiae*	*Siphonaria australis*

BIVALVIA

Family NUCULIDAE	Family MACTRIDAE
Nucula hartvigiana	*Scalpomactra scalpellum*
N. *nitidula*	Family TELLINIDAE
Family MALLETIIDAE	*Elliptotellina urinatoria*
Neilo australis	*Peronaea gaimardi*
Family ARCIDAE	*Pseudarcopagia disculus*
Barbatia novaezealandiae	Family PSAMMOBIIDAE
Family GLYCYMERIDIDAE	*Gari (Gobraeus) stangeri*
Glycymeris (Glycymerula) modesta	*Gari (Psammobia) lineolata*
Family PHILOBRYIDAE	Family SEMELIDAE
Cosa costata	*Leptomya retiaria retiaria*
Family MYTILIDAE	Family VENERIDAE/Chioninae
Aulacomya atra maoriana	*Tawera spissa*
Perna canaliculus	Family VENERIDAE/Dosininae
Modiolarca impacta	*Dosinia (Asa) lambata*
Family PINNIDAE	*D. (Kereia) greyi*
Atrina pectinata zelandica	*D. (Phascosoma) maoriana*
Family OSTREIDAE	*D. (P.) maoriana*
Ostrea chilensis lutaria	*D. (P.) subrosea*
Family PECTINIDAE	Family VENERIDAE/Tapetinae
Chlamys gemmulata	*Irus (Notirus) reflexus*
C. zelandiae	*Ruditapes largillierti*
Pecten novaezelandiae	FAMILY VENERIDAE/Venerinae
Family ANOMIIDAE	*Dosina zelandica*
Pododesmus zelandicus	Family CORBULIDAE
Family LIMIDAE	*Notocorbula zelandica*
Limatula maoria	Family HIATELLIDAE
FAMILY LUCINIDAE	*Panopea zealandica*
Divaricella huttoniana	Family THRACIIDAE
Family UNGULINIDAE	*Hunkydora australica novozelandiae*
Diplodonta (Zemysina) globus	Family MYOCHAMIDAE
Family LASAEIDAE	*Myadora boltoni*
Borniola reniformis	*M. striata*
Myllita (Zemyllita) stowei	*M. subrostrata*

THE NEWSLETTER AND ME – YET MORE !

By Jill Burnett

The saga continues – the first part of this article covering the years from 1979, when the newsletter started (and when, co-incidentally, I joined the Club), up until 1989 appeared in Volume 11 of *Cookia*. I had originally intended the whole article to appear in that issue, as the year 2000 seemed to be particularly appropriate for a bit of reminiscing, but time ran out, as it has a habit of doing, so I finished up at the 1989 Annual General Meeting.

NOW READ ON ...

12 1990

After 3 years as President, Ed Busby resigned, and was replaced by Don Watson, with John Marston as Vice President. The rest of the committee remained the same, but later in the year Ken Grange resigned from the editorship as he was moving to Nelson, and somehow we managed to persuade Elliot Dawson to take on the job. There was a real price hike in the subscriptions – the single and family memberships rose to $8 and $10 respectively, but with student and superannuitant rates remaining at $5. The weather was bad for the 1989 AGM because we held it on the fourth Thursday of the month. For several years we had held the AGM on a Saturday night, but in 1989 we changed back to the Thursday, and consequently endured what we came to think of as 'Shell Club night weather!' The weather gods had it in for us, especially during the years when we met in the Natural History Unit in Taranaki Street, a wide windswept street with no shelter from the rain. It seemed that every Thursday we went there, we waited outside the door in wet little huddle. We were there for the first meeting of the year, in January. However, it was always fine at Paraparaumu, and the barbeque at Gracie and Trevor Davies' home was once again a happy social occasion, with some special visitors, Vic and Lorraine Vercoe from Palmerston North, and Anita and Andrew Long with young Shaun over from Carterton. The evening was rounded off with a slide show – Hugo Hollis had some lovely slides of Queensland, and Vic Vercoe some interesting slides of land snails and native slugs. In April, on Anzac Day, we had a field trip and picnic at Onehunga Bay, on the Titahi Bay coast – our first outing there. We all enjoyed it, although Don Watson, who had brought his boat down, said the water was a bit murky for diving. Read all about it in *Cookia*, Vol. 6, No. 3, pp 27-31. Our March meeting was hosted by Jenny Raven, at her place in Brooklyn, and the guest speaker was Peter Jamieson back on a visit to New Zealand. He told us about his travels overseas, finishing up with a spectacular video of his trip to Iceland. At the next meeting, Pat Lakeman and Jenny Raven told us about their trip to Great Barrier Island, and, the month after that, Bev and Barbara Dunn gave a talk about their trip to South Australia. At later meetings, Don Watson told us about collecting at Kapiti Island, Jenny Raven at short notice filled in a gap and talked about the family Naticidae, Elliot Dawson spoke about the shells that aren't molluscs, his beloved brachiopods, and Betty Andrews gave us an insight into the Bluff oyster industry. We visited the Ministry of Agriculture and Fisheries at Greta Point for a talk by Dr John Cranfield on the research being done on the bivalves that live in the surf zone. Kris Woods joined us this year, and Hugo Hollis again went to the Auckland Shell Show and won several prizes. Mike Meads published his book *Forgotten Fauna*, and Alan Beu his *Cenozoic Mollusca of New Zealand*. The AGM was again held at the Lowry Bay Yacht Club, with a catered meal brought in, a raffle, and shells for sale – a programme for a happy evening.

13 1991

The same committee continued its good work for another year, and the subscriptions remained the same as for the previous year – thank goodness. For some reason, we didn't have a barbeque, but, on Anzac Day, Jenny Raven masterminded a field trip which consisted of a one-way walk between Onehunga Bay and Onepoto Bay, but some people walked the other way – but, thanks to Jenny's plan, everyone was re-united with their own cars at the end. I remember that the walk was divided into different zones and that we noted all the species that we found in each one. We went out to Seatoun on Waitangi Day and walked round towards Breaker Bay. It was a very calm, misty day, as I recall, with grey cloud merging into grey sea. An account of this day was eventually written up, and appeared in *Cookia*, Vol. 7, No.2, pp 39-40. In March, we visited the DSIR research vessel Rapuhia and had a great time looking over her and hearing how she operated on a research cruise. We all wanted to sign on as crew straightaway! Other meetings were a little more ordinary, but still very interesting – John Nunn showed us the shells he had found at Lyall Bay, Frank Climo talked about panbiogeography, Gracie Davies gave us a lively account of her trip to Australia, Alan Beu explained how the changing temperature of the sea had affected shell life over the last million years, we held a Cones and Cowries evening with the Museum's collection. At the end of the year, we heard that Bill Paul had died – he had done so much to get the Club started and keep it going in its early days. There was a change of scene for the AGM – it was held at Benny's Bistro at Paraparaumu Beach, where we had a great meal, and moved to the back of the restaurant for our meeting. Betty Andrews produced one of her diabolical puzzles, which was one by Elliot Dawson, and there were, as usual, raffles, lucky dip, and shells for sale. Betty's puzzle appeared in *Cookia*, Vol. 6, No. 4, p.7, if anyone wants to give it try again – there are some clues on page 38. I might to able to persuade our Editor to print the answers at long last as he promised to do so in the following issue but must have forgotten about it!

14 1992

There were a few changes to the committee this year – Bev Dunn replaced Pat Lakeman as librarian, John Nunn took on the treasurer's job in addition to his work as secretary, and Jenny Raven returned to running the trading table, as Meg Taylor was suffering from ill-health. The Club was in a sound financial position, so subscriptions were left at the same rates. In February, we went back to Gracie and Trevor Davies' place for another very enjoyable barbeque – the last one we had there, as it turned out. My memories are of the sun always shining in Gracie's lovely green garden. During the next few meetings, several lucky members told the rest of us stay-at-homes about their holiday trips. I think Jenny Raven was the luckiest – she got herself on a fishing boat for a trip down the east coast of Stewart Island from Halfmoon Bay to Port Pegasus. She wrote a good, long account of this in *Cookia*, Vol. 6 No. 4, pp 1-6. Also in this volume of *Cookia* are the reports of the club field trip to Mahia, which we heard about at the April meeting. The following month we gathered around Pat Lakeman's television to watch videos of Don Watson's holiday in the Marlborough Sounds, and in July, Hugo Hollis treated us to a slide show of some magnificent shells he had seen in America. We visited Mike and Barbara Meads at their new home in Pukerua Bay and had a very entertaining discussion about crabs, and we visited the Oceanographic Institute for a talk on its work by Dennis Gordon. We had a *Penion* evening, and a evening looking at the museum collection. We were glad to have Peter Jamieson back from overseas towards the end of the year, but

sadly we lost Meg Taylor who had been a very longstanding and hardworking member of the club. In September, we had a club field trip to Onehunga Bay, but unfortunately it started to rain after about half an hour. However, for once, we had fine weather for the AGM, which was again held at Benny's Bistro in Paraparaumu, and was another enjoyable evening in the best Wellington Shell Club tradition.

15 1993

The same noble people loyally offered (or had their arms twisted) to continue serving on the committee, and the subscriptions were also unchanged. We started the year with a barbeque at Don Watson's place in Otaki – our first meeting there, and all our keen gardeners were fascinated by the greenhouses, while the children enjoyed the trampoline. After we had eaten all the food we could, we crowded into Don's living room for videos of the underwater world of the Marlborough Sounds. In February, Jenny Raven told us about her trip on the *Te Aroha* from Auckland to Great Barrier Island, and Pat Lakeman told us about her holiday with Graham and Jenny in Northland where they stayed with Bob and Betty Grange and visited all the best beaches. The following month we went out to Greta Point for a talk on algal blooms from Peter Smith of the Fisheries Research Division. We were back at Greta Point in June, this time at the Oceanographic Institute to hear Ken Grange talk about White Island and the effect of the volcano on marine life. We had a very interesting talk from Peter Jamieson about his trip to Egypt and collecting in the Red Sea, and later in the year Peter led a discussion on the Pectinidae. There was a *Maurea* evening – Don Watson's *Maurea* were especially magnificent - , a fossil evening, and a evening with the museum collection. We heard about John Marston's visit to the Auckland Shell Club auction and his trip round Northland with Bruce Hazelwood. Dick Dell's talk in September traced his career from the start of his interest in shells as a boy, to the founding of the Wellington Shell Club – if you weren't there, you can read about it in *Cookia* Vol. 7 No. 2, pp 1-4. Members had their ups and downs, and at the beginning of the year we had the sad news of Betty Wolf's death. Bev and Barbara Dunn moved to Foxton, but still came in regularly to meetings, and Doreen and Ivan Burr moved back to Wellington and joined us at the March meeting. Judy Hardie had a trip to America, Gracie Davies went to Scotland, Trevor Davies to Vancouver, and everyone had the 'flu over the winter – someone gave it to me, I remember; it was very nasty and I've avoided getting it ever since. Pat Lakeman missed several meetings, offering such feeble excuses as work, cricket, and work, but Mike Meads, whose job folded up in November, turned up after a long absence. Don Watson and Jenny Raven did very well with their exhibits in the Auckland Shell Show – Jenny had the brilliant idea of reproducing the familiar green cover of Powell's old *Shells of New Zealand* as a prize-winning exhibit. And then it was the end of the year, and another AGM, again at Benny's Bistro. Unfortunately, this time we didn't have the restaurant to ourselves, so the evening didn't run quite so smoothly – it didn't run smoothly at all for Don Watson who forgot to pick up Betty Andrews on his way in, and had to go back and collect her while everyone else was drinking and making merry!

16 1994

This year, Jenny Raven took over the secretary's job, and I added the treasurer's role to my repertoire; otherwise the committee, and the subscriptions were the same as the previous two years. The first meeting of the year was held at Mike and Barbara Meads' new home in Pukerua Bay. Some of us arrived early to enjoy the sunny afternoon on the beach, then Mike and Barbara took us on a guided tour of their garden. When we went indoors, the collections of beetles, butterflies, matchbox cars and other treasures proved almost as fascinating as the shells. It was a small gathering that month, as some members were away, having an even more interesting time – the first club trip to the Chatham Islands. Everyone turned up to the February meeting and barbeque at Don Watson's place to hear about this. After eating far too many sausages, we all crammed into Don's living room, men offering to sit on the women's knees, to watch the video of the trip. We saw the shells from the Chathams at the next meeting, which was held at Ed and Betty Busby's home, in terrible 'Shell Club night' weather – that was the night there was a call out at the fire station next door, the siren sounded and drivers grabbed their keys and raced out into the gale to shift their cars. In spite of that, it was a great evening, the shells and photos filled us with envy and enthusiasm, and the issue of *Cookia* to read is Vol. 7 No. 3. There was another field trip, all the way to Titahi Bay, at Easter, and this is recorded in *Cookia* Vol. 7 No. 2, pp 37-38 (the date is shown as 1995 in *Cookia* but it should be 1994 – probably my mistake). For the rest of the year, it was back to the Natural History Unit for our meetings – Wendy Nelson gave us a talk on seaweeds, we looked at the sunset shells, Rick Webber told us about the relocation of the museum to the waterfront, Mary Agnes Wotton brought us up to date with the latest changes to the limpet families, Edmund Busby spoke about nudibranchs, and Alan Beu explained the evolution of the Pectinidae. At the June meeting, the club voted in favour of holding a Shell Show in May 1995, to celebrate its 40th anniversary, with Peter Jamieson, Jenny Raven, Pat Lakeman and myself as the organising committee. I remember that when Peter first put forward the idea of a shell show, I thought 'very nice, but it won't concern me. I'm not into shows.' How wrong I was. We met every month, having pot luck teas in each other's homes, and by the end of the year we had found a venue, found a sponsor, drafted the rules and information sheet, organised garage sales. Kris Woods and Gracie Davies were organising a sales table and Bev Dunn was producing hordes of shell critters. Doreen and Ivan Burr escaped from this mad rush of activity by moving to Nelson, in fact they spent most of the year going to and from Nelson. Mike and Barbara Meads had a trip to Hong Kong and Bali, Gracie Davies went to Fiji, Judy Hardie to the U.S.A., and Peter Jamieson flew off to Britain and the Paris Shell Show. There were also quite a few absences during the year due to illnesses and operations – Ed Busby, Hugo Hollis, Helen MacFarlane, Trevor Davies, and Mollie Logan were all on the sick list. However, there was a good turnout for the AGM, which was held at the Waikanae Motor Hotel. We spent a lot of time discussing a constitution which we needed to meet Inland Revenue Department requirements, but there was still time for the real business of the evening – socialising and shells.

17 – 1995.

The year of our 40th anniversary, and the year of our first shell show, the first national shell show – a very special year in our club history. Peter Jamieson replaced John Marston as vice president, but otherwise the same committee continued in office, and the subscription rates remained the same. The January meeting was held at the home of Peter Jamieson in Northland, and Peter gave a very encouraging and enthusiastic talk about how to enter a shell show – the aim was to convince all members that they could and would enter the show, however humble their collections. In February, we went to Don Watson's again for a lunch time barbeque, followed by a tour of the gardens and glasshouses and, lastly, the meeting – another happy, social occasion enhanced by a fine, sunny day. Both the March and April meetings were held at the Natural History Unit with the museum collection, to give members a chance to check names and identifications of shells they wished to enter in the show, and Bruce Marshall's help with this was much appreciated. By this time, the show filled all our waking thoughts, and probably our nightmares as well. Committee meetings were stepped up, the newsletter ran to two pages, filled with reports, instructions and exhortations, the garage sales had gone well, and the children's colouring competition attracted a large number of entries. The entries for the show came in, and the committee started to panic over the size of exhibits, size of the room, and table space. The posters were printed, and Pat Lakeman and I spent one evening walking through central Wellington with a bucket of paste, sticking them up. We wrote lists of things to do and things we needed, and drew up duty rosters. And, amazingly, it all worked. From the welcome committee in the car park, we got through the chaos of a hundred and something exhibits being set up, and were ready for judging on Friday night, with just the right number of exhibits for the table space, and the room bright with posters and the best entries from the children's colouring competition. On Saturday we opened the doors to the public – and they came; those manning the door and the sales table were kept busy. In the evening, there was the prizegiving, a talk by Dick Dell who started it all, an auction and raffles, and somehow Elliot Dawson managed to produce an issue of *Cookia* to hand to members. Another public day on the Sunday, excitement over winning the Americas Cup, and then it was time to pack it all up, see people off to the airport or ferry terminal, and collapse. I remember sitting on the floor of the bare room, too tired to drag myself to my feet and go home, even though I knew there was a very disgruntled and 'feeling neglected' dog waiting for me, and, what's more, waiting for a long evening walk. We had a post mortem of the show at the May meeting, and several members brought along their exhibits so we were able to look at them at leisure. And next time I posted the newsletter, I was able to put faces to a lot of names I had been sending newsletters to for years. In June we visited NIWA at Greta Point, for a talk about octopuses by Steve O'Shea, and we all swapped stories about close encounters with an octopus. We visited Pat Lakeman's home in July, where we saw the video of our Shell Show, and Jenny Raven talked about the shells of Raoul Island. At the end of July, there was a field trip to Castelepoint, and we heard about this when we met in John Marston's cosy little flat the next month. In September, we heard about the recovery plan for endangered *Placostylus* from Greg Shirley of the Department of Conservation, in their conference room in Tory Street. It was back to Pat Lakeman's home in October to hear about her trip to Northland, and the club had a day trip to Marfell's Beach at the end

of October. Unfortunately, neither this nor the Castlepoint trip was written up for *Cookia* – perhaps everyone was still too exhausted after the show. The show brought in several new members to meetings over the last few months of the year, and in April, Don Watson had brought Nona Browning along. However, it was also a year of loss for the club – Hugo Hollis, Peter Jamieson , and Bev Dunn, all valued members who had contributed so much over the years. Several other members were suffering from ill health, so a number of familiar faces were missing from the meeting table. We still had a good crowd at the AGM, though, which was held at a new venue, the Hardwick Smith Lounge in Belmont. Judy Hardie arranged this for us, and she also arranged perfect weather so all the keen gardeners could enjoy the lovely grounds. Everyone helped to arrange a magnificent pot-luck tea, and Ian Cooksley gave a demonstration to a spellbound audience of how to eat a mallowpuff – what an end to our 40th anniversary year.

18 – 1996

The club was in a very sound financial position after the shell show, so the subscriptions remained the same, but there were some changes to the committee. Jenny Raven became vice president, John Marston, in spite of family commitments in Blenheim, took on the secretary's job, his second stint, and Judy Hardie, with one of our new members, Kim Walton, looked after the library. Unfortunately, Kim found it difficult to get along to meetings on Thursday nights, so resigned during the year, and her friend Tracey Newman offered to take over from her. Some more new members joined us at the January meeting, John Cryer with his son Richard, and Deirdre and Digby Standish. Several members had attended the auction of Peter Jamieson's shells and reported that they had been bought by an American at high prices. In February, there was a good gathering, including some of the new members, and Anita and Andrew Long all the way from Carterton, for our barbeque at Don Watson's place. We saw the museum collection in March, and in April our meeting fell on Anzac Day, ideal for a field trip to Lyall Bay and Princess Bay where there was a good wash-up of shell sand. We finished up at Jenny Raven's home in Strathmore for the meeting, and everyone thought that her collection was just as good as the museum's. In May we met in John Marston's flat for a talk by Ian Stringer and Chris Devine from Massey University about their work on land snail research. At the next meeting, Pat Lakeman and Jenny Raven told us about their trip to Stewart Island. The following month we gathered at Pat Lakeman's home for a talk about New Zealand limpets by Mary Agnes Wotton. In August Nona Browning invited us up to Otaki to see her lovely cowries. In September Don Watson showed us tray-loads of his wonderfully coloured *Chlamys*, and in October Pat Lakeman and Jenny Raven told us about yet another holiday, this time around Northland, and Helen MacFarlane spoke about her trip along the Queensland coast. Earlier in the year, Jenny Raven visited Tauranga and met Eric and Aileen Edmunds, Judy Hardie had a trip to Canada, Ian and Heather Townsend holidayed in Hawaii, Mary Agnes Wotton went tramping in the Himalayas, and Doreen and Ivan Burr came over from Nelson for a couple of meetings. Sadly, Trevor Davies died in March, and Gracie was very ill – they were both greatly missed from the meetings. We heard that Mike Meads was unwell, and Barbara Meads gave up full time teaching at the end of the year. In September there was a field trip to Marfell Beach, and on Labour Day there was an outing to Moa Point, the first of several trips around

Wellington coast over the summer. And so another year was gone, culminating in another happy and noisy AGM at the Hardwick Smith Lounge.

19 1997

The same subscription rates and the same dedicated and devoted committee members served us for another year. We started with a meeting at the home of Deirdre and Digby Standish. Everyone enjoyed exploring their unusual house, and some members found the model railway every bit as fascinating as the shells. Don Watson kindly offered his home for the barbeque in February again, another happy event – once everyone had arrived. Pat Lakeman was the obvious scapegoat to blame for the delays on the roads and was exhorted to fix the problem before next time. We gathered in John Marston's flat for the March meeting, which rapidly became uproarious, and must have sounded more like a wild party than a sober shell club meeting. In April we met at the Natural History Unit, and Pat Lakeman, Jenny Raven and Tracey Newman made us all envious with an account of their trip to the Chatham Islands – you too can be made envious by reading about it in *Cookia* Vol. 8 pp 1-25 and Vol. 9 pp 12-30. Our May meeting was again at the Natural History Unit, this time on the third floor with the museum collection. We visited the Standish household again in June, met the new kitten, and heard about Deirdre and Digby's trip to Mahia. At the July meeting, Judy Hardie told us about her trip to Samoa, which she recorded in *Cookia* Vol. 8 pp 16-18, and Pat Lakeman and Jenny Raven showed us some of the exhibits they had entered in the Whangarei Shell Show. In August, everyone brought along their Turbinidae, and Pat Lakeman's study notes are in *Cookia* Vol. 8 pp 37-38. We met at Pat Lakeman's place in September, where Doreen and Ivan Burr showed us the shells they found on their trip to England; and Ian Townsend showed us a video, as well as shells from his trip to Rarotonga. The big attraction of the October meeting was seeing the terrapins installed in a large tank in Deirdre and Digby Standish's living room. In addition, they showed us shells dredged in the Marlborough Sounds, and along with Pat Lakeman and Jenny Raven told us about the club trip to Marfell's Beach which had been held earlier in the month. During the year, the club also held outings to Princess Bay in January, Owhiro Bay at Easter, and Green Point on the Titahi Bay coast in September – there is a short account of this on page 38 of *Cookia* Vol. 8. Several lucky club members went off on their own trips – Mary Agnes Wotton to America, Barbara Sutherland to China and Europe, Don Watson to the Marshall Islands, and Bruce Hazelwood took a trip from Auckland to Wellington and joined us at our May meeting. A new member joined us at our September meeting, Jim Harding from Nelson, brought along by Ian Townsend – Jim and I were remembering this last time he was over, and the meeting again happened to be at Pat Lakeman's home. On the debit side, we lost both Gracie Davies and Mollie Logan, lovely ladies who had been so much a part of the club for so long. And at the AGM, Betty Andrews told us that she would not be able to make the journey down from Wanganui to the meetings any more, and that was her last meeting. We made it a good one – great food, great raffle prizes, great sales tables, and a great time had by all in the lovely venue of the Hardwick Smith Lounge in Belmont.

20 1998

The same keen people continued to run the club in 1998, with the addition of Deirdre Standish helping with the library. In fact, we all helped with the library, as we started the year by having a stock-take of all the books in our library cupboard at the Natural History Unit. Once again, February was the month for our barbeque at Don Watson's place, and Don told us all about his trip to the Marshall Islands, with boxes of the lovely tropical shells he found on display. Don's account of his trip appears in *Cookia* Vol. 9 pp 39-48, and Elliot Dawson has provided some background information on pages 49-54. A much more mundane topic, cleaning shells, was the focus of the March meeting; everyone chipped in with their favourite methods and recipes, and stories of their adventures and misadventures – it's always the very biggest shells that dissolve in acid! Deirdre and Digby Standish had been out to Eastbourne, and described the effects of the algal bloom – this is written up in *Cookia* Vol. 9 p. 75. They also told us that they had swapped two members of their family for shells – the lengths to which some people will go – the terrapins had been re-housed in the Island Bay Marine Centre. In April we heard about more overseas holidays: Kris Woods told us about her trip to Australia, and Pat Lakeman and Jenny Raven shared their experiences in entering the second Australian National Shell Show in Sydney. In May, we all descended on John Marston's little flat, and in between the servings of sausage rolls, Jenny Raven, Pat Lakeman, Digby Standish and Ian Townsend told us about the pleasures and hazards of fossil hunting in Wanganui. It was back to the Natural History Unit in June for a study of *Buccinulum*, followed by a meeting at Pat Lakeman's home where Mary Agnes Wotton explained how to collect microscopic shells. In August we visited the museum collection on the third floor of the Natural History Unit, and also heard about the trip that Ian and Heather Townsend and Jenny Raven made to Mahia – Ian wrote a good account of this for *Cookia*, Vol. 9 pp 7-11. We next met at Deirdre and Digby Standish's home, where Jenny Raven showed us an impressive array of shells she had collected in Northland, and in October we heard about another trip to Australia – Don Watson had been over to Port Douglas. In September, the club had a field trip to Green Point, Titahi Bay. Earlier in the year we explored Lyall Bay and Princess Bay, and there was the fossilising trip to Wanganui, which, as it turned out, was an opportunity to say goodbye to Betty Andrews. Her death meant the loss of yet another of our older members. However, we re-gained Harry Tibble, and also Peter Cresswell, both long-lost members from way back, John Little was persuaded to join us, we had a visit from John Nunn, now living in Dunedin, and our Nelson members, Jim Harding and Doreen and Ivan Burr, regularly popped over to Wellington. Thanks to Judy Hardie, the AGM was again held at the Hardwick Smith Lounge, and thanks to everyone, it was a happy and friendly social gathering.

21 – 1999

There was only one change to the committee in 1999 – Deirdre Standish took over the secretary's job from John Marston, who was busy dividing his time between Wellington and Blenheim. We started the year with a meeting at Jenny Raven's home, and her talk and demonstration of how to use the internet was very popular – even the anti-computer diehards seemed to be quite mesmerised. Once again, February was the month for our

barbeque in sunny Otaki at Don Watson's place, and once again it was a fun-filled afternoon. The meeting, meal, and garden tour were topped off by a video of the Te Awaiti field trip – this was a masterpiece of comedy, and showed us how those who go on field trips actually spend their time – quite an eye-opener. There is a good account of the trip by Pat Lakeman in *Cookia* Vol. 10 pp 6-8, and a more serious article by Don Watson in the same volume, pp 11-15. We met at the Natural History Unit in March; Jenny Raven talked about our outing to Balaena Bay the weekend before, and Kris Woods showed us some of the shells Gracie Davies had collected in Tonga. In April we visited Ed and Betty Busby for a friendly, social, Sunday afternnon, with several people passing around their holiday finds. Deirdre and Digby Standish's home was the venue for the May meeting – again several people reported on trips they had made, and Kris Woods brought along a box of shells she had received from a Belgian collector. We were back at the Natural History Unit in June to see the museum collection, and in July we had another Sunday afternoon meeting, in Pat Lakeman's living room. The afternoon started with a re-play of the Te Awaiti video. Jenny Raven and Ian Townsend reported on their trip to Mahia and East Cape at Queen's Birthday Weekend (Jenny wrote about Lottin Point in *Cookia* Vol. 10, p. 9); then Pat Lakeman and Jenny Raven told us about their trip to Australia to the Queensland shows, showed us some of their prize-winning exhibits, and finally, with great drama, Jenny unwrapped her find of a magnificent baler shell – a very full afternoon. There is an account of the shows by Pat Lakeman in *Cookia* Vol. 10 pp 1-3. In August we visited Judy and Ross Hardie. Jim Harding and Doreen Burr both came over from Nelson for the meeting – quite separately, they assured us – and Doreen brought us some shells from Rabbit Island, while Jenny Raven had a box of shells from Taiwan to show. The next month at the Natural History Unit, both Jim Harding and Doreen Burr turned up again, again quite separately of course. Jim was staying over in Wellington for a while, so Jenny Raven organised an outing to show him Onehunga Bay, and at Labour Weekend, there was a field trip to Wanganui. Doreen and Ivan Burr had to be up there for a wedding, and that was a good excuse for a fossil hunting expedition. It rained, but it didn't dampen their enthusiasm, judging from what we heard about it at the October meeting. The October meeting was the last one held at the Taranaki Street premises which we had used since 1989. Over the summer, the Natural Environment Department moved to new premises in Tory Street, and thanks to Bruce Marshall, our library cupboards moved with it, and we were able to use a very spacious room in the new premises for our meetings. Old habits die hard though – a year later, I still occasionally find my feet taking me to Taranaki Street. We seemed to have had a bit of a publicity drive during the year. Jenny Raven and Pat Lakeman got themselves into the *Contact* and *Norwester* papers, and Helen MacFarlane displayed a table of shells at a show of collectables in Upper Hutt, attracting the attention of Jill Griffiths who had been a member of the club when I joined, way back at the beginning of this story. Others will remember her – we still have a number of members who have been in the club a lot longer than 21 years, and although we have lost a lot of friends over the years, luckily new ones keep joining us. There are still a lot of crazy collectors out there who want to get together to talk about shells, and it was a lively group that met at the Hardwick Smith Lounge for the AGM. After 10 years as President, Don Watson stood down from the job, amid our thanks for his hard work, and after 10 years of holding the subscriptions at the same rate, we decided that it was time for a small increase to all except the

superannuitant/student rate. An innovation at this AGM was a multi-draw raffle, in addition to our usual raffle and sales tables. Pat Lakeman organised a hundred prizes of all descriptions, both weird and wonderful, and this was drawn, with much noise and laughter, as the grand finale of the evening – a great way to end the year, the decade, the century, the millenium.

-oOo-

And here's another few thoughts of a lighter kind …

'SHELL COLLECTOR'

Here's to the sunburn, the sprain in your back,
The windburn, the chill, the weight in your sack,
The bottles and the bags, the unpacked gear,
All strapped around you and banging your rear.
Here's to the barnacle gash and the bruise,
The salt in your eyes, the sand in your shoes.
Here's to the stink in the cottage at night,
The boiling, the cleaning and scrubbing just right.
The searching through crud 'till your eyes dull with pain,
For the needed elusive unspellable name.
Here's to the polishing, boxing, arranging,
Consulting, re-sorting, re-naming and changing.
Here's to the weariness, lameness and cuts,
And to all the people who think we are nuts.
We go on collecting foul weather or fair,
Not minding at all with a glassy eye stare,
For the sane of this world who look on in surprise,
We keep right on looking for that wonderful prize,
For the shell with a bump, some spots or a twist,
Ah! This shell is best and hard to resist.
So you keep right on walking, or diving or dragging,
It's time to head back and on your return,
You still look for more, you'd think you would learn.
So you stumble along, keep collecting and pray,
That tomorrow will bring another good day.

[Thanks to our member in Cambridge, Barbara Jouvernaux, who found this on the 'net' where it had been placed by Dr José H. Leal, Director of the Bailey-Matthews Shell Museum, Sanibel Island, Florida, who discovered it, author unknown, in the museum archives.]

MARINE MOLLUSCS FROM CAPE KIDNAPPERS, NAPIER; CASTLEPOINT, AND THE WAIRARAPA COAST TO CAPE PALLISER

By Margaret S. Morley and Jenny L. Raven

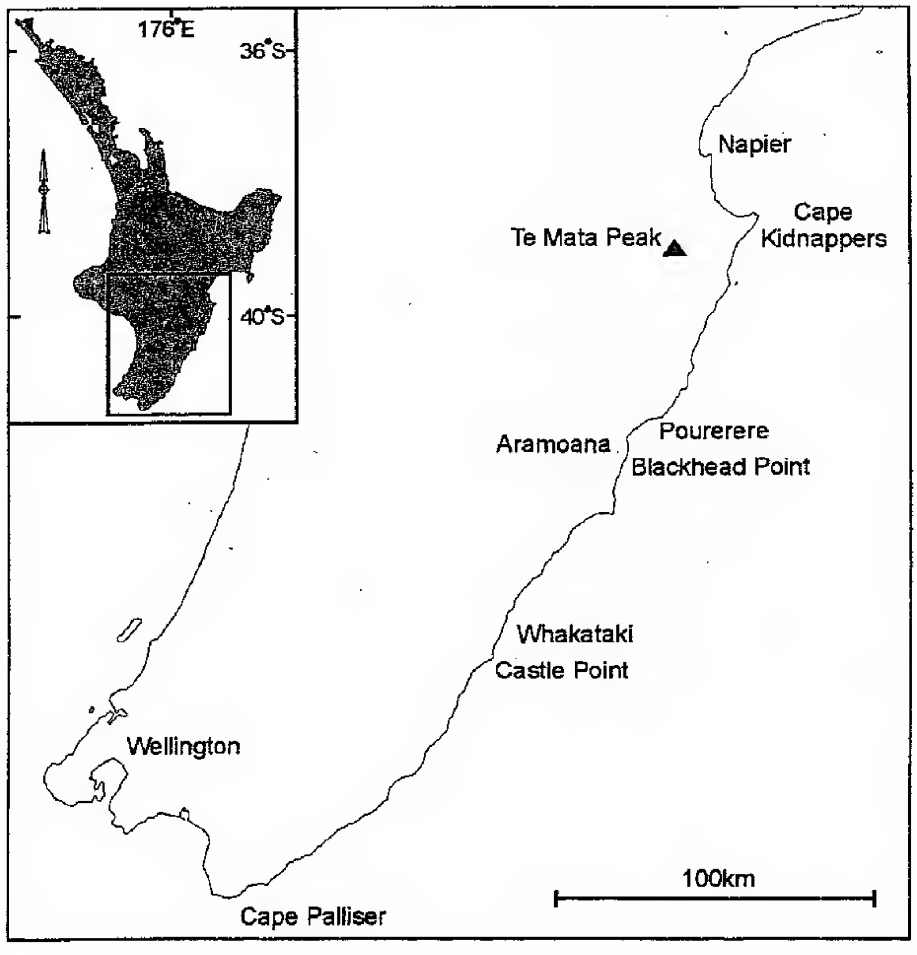
SUMMARY

One hundred and sixty-one recent mollusc species (8 chitons, 101 gastropods, 49 bivalves and 1 cephalopod) are recorded from Napier, Cape Kidnappers, Pourerere, Aramoana, Blackhead, Castlepoint, Whakataki and Cape Palliser. These records extend the range south of 7 species (3 gastropods, 4 bivalves).

INTRODUCTION

The Pourerere, Aramoana and Blackhead lists were compiled by Jenny Raven (JR) from a visit there in February 2001. The Castlepoint section of the checklist has been compiled from a species list by the Wellington Shell Club (1976, 1982), also by the authors' visits in 1995 and 2000 (JR unpublished) and April 2001 (MM).

The Cape Kidnappers, Napier and Cape Palliser sections were obtained from a 2001 visit (MM). The Cape Palliser visit was only brief, the list could be much enlarged by further study.



Additional information on all localities is included from the Auckland War Memorial Museum collections. A few fossils are included but the main focus is on recent species.

Names are updated from Spencer & Willan (1996) and Marshall (1998a, 1998b).

COMMENTS ON TRIP TO POURERERE, ARAMOANA AND BLACKHEAD (JR)

In February 2001 I spent a few days camping at Aramoana on the southern Hawkes Bay coastline. Pourerere, Aramoana and Blackhead are three beach settlements accessed by a good road from Waipawa. Aramoana boasts a camping ground; however it had been sold and was to close a few weeks after we left to make way for a private development. Being situated between the other two settlements it did however provide a good base. The beaches are easily accessed from roadside parking and it is possible to walk at all tides between each of the settlements. Each has a lovely sandy beach separated by large papa reefs which at the low tide are exposed seawards over several hundred metres. The area from Aramoana to Blackhead is a marine reserve.

Washups were few. The shells most frequently washed up are *Cookia sulcata* which are a nice orange colour along this coast. I found one such specimen washed up in the middle of Aramoana beach. There are also some good areas of shell sand along the tide line in the rocks although about 80% of this consisted of *Micrelenchus sanguineus*. The reef areas were very interesting with necklace weed (*Hormosira banksii*) covering much of the reef at the low tide. *Buccinulum colensoi* was very common under low tide mudstone rocks. Between Aramoana and Blackhead areas of hard rock suddenly replaced the mudstone. Although there were as many turnable rocks as previously, *B. colensoi* was rare under these non-mudstone rocks. thus supporting the view that *B. colensoi* like *Cellana flava* is a mudstone inhabiting species. I have also noted from collecting along the Wairarapa coastline that once you go off the mudstone, *B. vittatum* replaces *B. colensoi* under the non-mudstone rocks. Larger *Buccinulum* species seem to similarly experience a change in mudstone areas.

There is one variety of *Buccinulum* I have found from Gisborne to the outer Wellington Harbour that has a chalky white surface, faint brownish spiral lines, a narrow neck, is dentate and has an apical tooth within the opening. It is generally found at very low tide in sandy rock crevices or under rocks. Over the years I have labeled these shells both *Buccinulum pallidum* and *B. fuscozonatum*. It now appears to be *B. linea*. Roll on the DNA results which hopefully will sort out the complications borne by this family particularly in mudstone areas !

Cominella glandiformis was present in the high tide pools and *Diloma coracina* round the edge of sand pools. Nothing else particularly unusual turned up. I was, however, delighted to find a live *Ranella australasia* on the reef between Aramoana and Pourerere. It was small and encrusted but nice to see, particularly as on my only other visit to Pourerere some 20 years ago I had also found a live specimen on the reef. I made a list of the shells I found during my stay and am sure that with more time there would be many more species to add. I can certainly recommend the location to any one who wishes to take on this task.

COMMENTS ON 2001 TRIP FROM NAPIER TO CAPE PALLISER (MM)

CAPE KIDNAPPERS, NAPIER

Young sedimentary rocks deposited under the sea during the last 5 million years form the coastal area of Hawkes Bay. The strata have been tilted to the north west since being deposited. At Cape Kidnappers the rocks are between 300,000 and a million years old. The dark layers, composed of estuarine muds and river gravels contrast dramatically with pale layers of volcanic ash that erupted from the Taupo-Rotorua region (Hayward 1996). Many of the strata have fossils.

25 April 2001.

On the way south from Napier to Cape Kidnappers Peninsula we stopped at a shelving beach composed of endless grey stones. A small wash up gave battered evidence of the trumpet shell *Cabestana spengleri,* siphon whelk *Penion sulcatus,* triangular trough shell *Spisula aequilatera,* green lipped mussel *Perna canaliculus* and horse mussel *Atrina zelandica* (Fig. 2).

At Clifton, a tourist operator provided transport with a tractor and trailer, which rumbles along the shelving gravelly shore including some rocky patches. Passengers sit on the trailer and although we were threatened by the driver with a wetting from the waves it was never more than the odd splash. To do an independent trip you have to be able to walk 10 km each way from Clifton. The other more expensive option is to hire trail bikes.

We were lucky to have perfect conditions, plenty of sun in a clear blue sky and no wind. The contrasting strata in the 200 m cliffs stood out boldly in the strong sunlight. At intervals faults which were produced by earthquakes were obvious. Fossiliferous layers were enticing to look at, but fossils crumbled at the first touch. We were allowed several stops along the route each with an explanation. The final lunch stop gave time to walk up the track to view the gannet colony and the deep blue sea with its spectacular coastline.

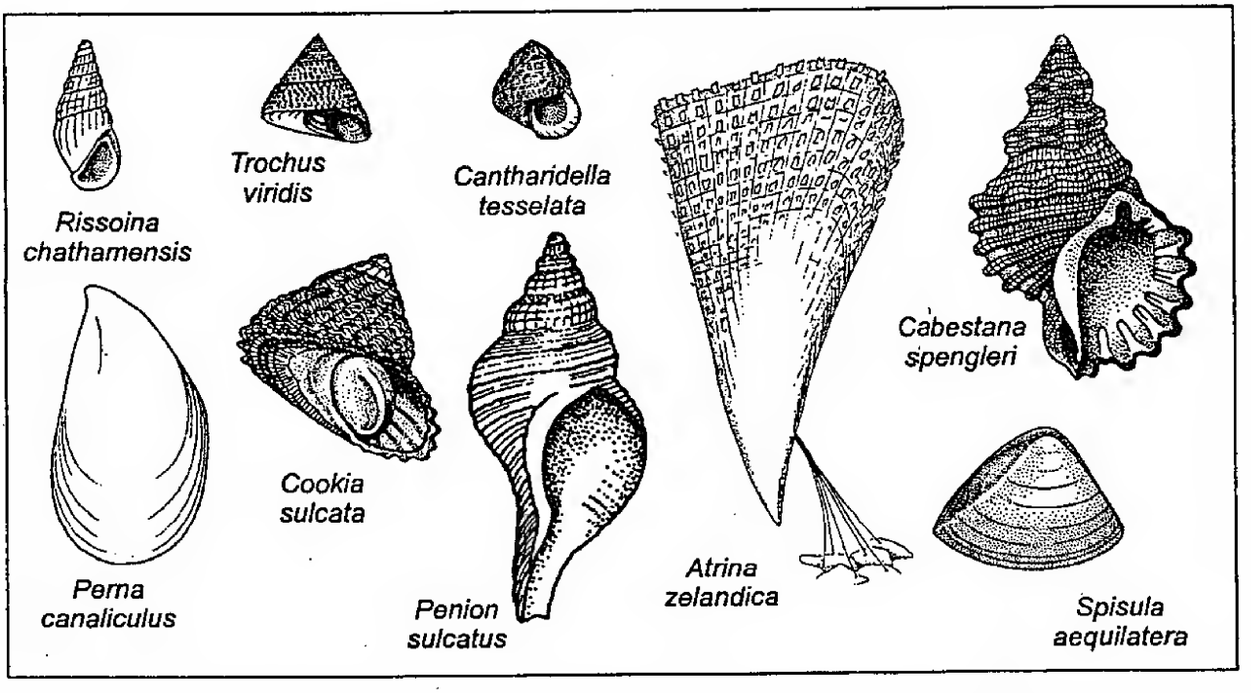


Fig. 2 Recent Molluscs from Cape Kidnappers. Specimens drawn by Powell (1979) and Margaret Morley.

A brief look at the intertidal platform showed many seaweeds and clear pools with numerous hermit crabs. These yielded specimens of Cook's turban *Cookia sulcata*, *Penion sulcatus*, green top shell *Trochus viridis*, and small *Rissoina chathamensis*. The small brightly patterned trochid *Cantharidella tesselata* was common on low tidal rocks and algae. Occasional specimens of the siphon limpet *Siphonaria propria* and golden limpet *Cellana flava* adhere to rocks (Fig. 2).

A hastily grabbed handful of low tidal shell sand and a bag of algae added a few micromolluscs to the list. These included *Sagenotriphora ampulla*, *Amphithalamus semen*, *Eatoniella albocolumella*, *Pisinna zosterophila* and the small bivalve *Gaimardia finlayi*. Together with the children I was reluctantly shepherded away for the tide-dependent return trip.

The stop at Black Reef gave another short collecting opportunity. The wash up included the shield shell *Scutus breviculus*, the trumpet shell *Ranella australasia*, white rock shell *Dicathais orbita* and *Cookia sulcata*. The driver also stopped by my request at a promising fossil spot. Species collected here from soft siltstone in the cliff were several gastropods *Leucotina ambigua*, *Zeacolpus taranakiensis*, *Maoricolpus* sp., *Amalda* sp., *Xymene* sp. and the large pectinid bivalve *Zygochlamys delicatula*. Apparently at times, the *Z. delicatula* wash out of the cliff in big numbers, but not when we were there, though I did find some convincing pieces! Also present were fossils of species still living there today.

Apart from time constraints this trip was very enjoyable.

2 KM SOUTH OF PORT NAPIER

The low tide boulders appeared to have a low diversity. Species found were *Chiton glaucus*, *Sypharochiton pelliserpentis*, *Nodilittorina antipodum*, *Turbo smaragdus*, *Lepsiella scobina*, *Cominella maculosa*, spawn of *Bursatella leachii*, barnacles *Chaemosipho columna* and friable masses of the sand tube worm *Neosabellaria kaiparaensis*.

INNER NAPIER HARBOUR

This area was uplifted by the 1936 earthquake. This is borne out by old trough shells *Cyclomactra ovata*, pipi *Paphies australis* and cockle *Austrovenus stutchburyi* washing out from shell banks that today are at or above high tide level. There are extensive swards of the red tinged bronze salt marsh plant *Sarcocornia*.

The mollusc species living there today at a slightly lower level are *Notoacmea helmsi*, *Amphibola crenata*, *Cominella glandiformis*, *Macomona liliana* and *Austrovenus stutchburyi*.

TE MATA, 20 KM SOUTH OF NAPIER

From the summit, 399 m above sea level, spectacular views include all of the Hawke Bay to the south, beyond Hastings to the west Ruapehu, Tongariro and Ngauruhoe. Limestone outcrops contain fossils dominated by oysters and pectinids, aged between 1.8 and 3 million years old.

Fossil bivalves including *Glycymerita hurupiensis*, and brachiopods were collected from a cutting in the Chambers Track on the lower slopes of Te Mata.

Fig. 3 View over Castlepoint.

CASTLEPOINT

A calendar photograph of Castlepoint at dawn had been the initial impetus for the 2001 trip (MM and husband). When we saw the magnificent view of the lighthouse and lagoon (Figs 3, 4) from cabin nine perched high on the cliff, we were not disappointed.

The next day we walked up to the lighthouse. In places at the side of the track fossil barnacles and *Zygochlamys delicatula* form thick layers. The presence of this cold water bivalve suggests that sea temperatures were very cool during the formation of the limestone, which is about 2 million years old near the beginning of the ice ages. *Z. delicatula* today live in the deep cold water off south Otago. About 70 species of fossils have been recorded from Castlepoint. (Homer & Moore 1989). The siltstone beneath the limestone is 4-5 million years old.

Later that day I climbed around the rocky shore on the north side of the lighthouse to the large cave that opens on both sides of the peninsula (Fig. 4). It can only be accessed at low tide. This is an awesome place, cloaked in darkness the wave surge roars in, echoing around the cave vault and this was on a calm day! The large, smooth, slippery, rounded boulders are constantly wet and treacherous to climb on even with a torch. The deep inky pools below did not look inviting! It was a relief to be safely back in the daylight.

The intertidal rocks are the habitat of many species (Fig. 5). The upper shore has a large periwinkle population of *Nodilittorina antipodum.* The brown rock shell *Haustrum haustorium,* top shell *Melagraphia aethiops,* the oyster borer *Lepsiella albomarginata* and flea mussels *Xenostrobus pulex* are common on intertidal rocks. Limpet species are also common including *Cellana denticulata,* C. *omata* and C. *radians.*

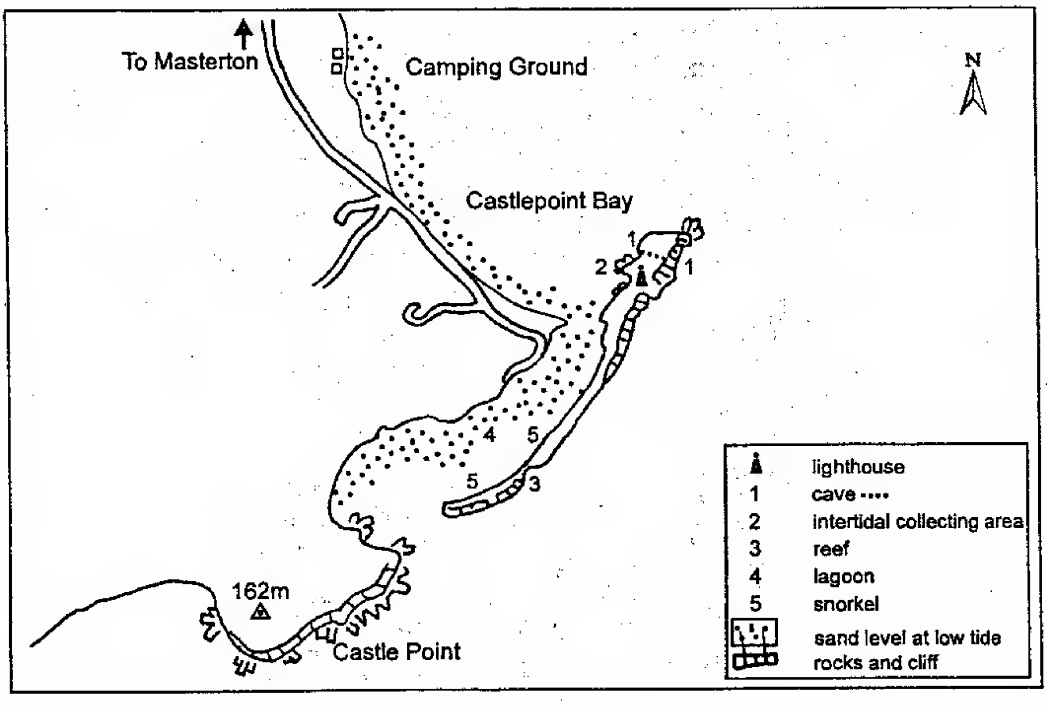


Fig. 4 Sketch map of Castlepoint to show collecting areas.

The attractively patterned whelk *Buccinulum colensoi* appears to replace *Buccinulum vittatum* found in similar habitats in other localities. The range of *B. colensoi* is from East Cape to Castlepoint (Powell 1979). The strong parietal tubercle and dentate aperture only develop in mature specimens (pers. obs.). Bivalves *Borniola reniformis* and fan shell *Chlamys zelandiae* live under low tidal rocks. Rock washes show that the microscopic *Merelina lyalliana* is common.

At low tidal level on rocks and algae are numerous encrusted limpets *Patelloida corticata, Canthariella tesselata* and the small colourful trochids *Micrelenchus sanguineus* and *M. dilatatus.* Much less common is the swollen trumpet shell *Argobuccinum pustulosum tumidum* and large white *Buccinulum linea* (JR). Under larger rocks the paua shells *Haliotis iris* and *H. australis* are common. The hermit crabs provide more species such as *Cantharidus opalus* and siphon whelks *Penion sulcatus* (Fig. 5). These were the southern form lacking the angled whorls and nodose axial folds of northern specimens. A large sea hare *Aplysia keraudreni* and a second specimen of a different species of *Aplysia,* were seen at extreme low tide among rocky ledges and algae.

A bean cowry *Trivia merces* was found washed up near the lighthouse in 1982, and in January 2000, a large *Crepidula profunda* was found living on the back of *Turbo smaragdus* under a large rock at low tide (JR).

Castlepoint Lagoon snorkel

Since the seas were relatively calm during our visit I decided to snorkel in the lagoon. The tilted strata of the reef slope down at 45° to a sandy bottom. At first there wasn't much to see but as I moved out from the beach sea life increased. Stacked along the ledges below 2 m depth were the greatest number of *Scutus breviculus* I have ever seen. These were large specimens, many crawling about with tentacles waving. The filamentous green algae *Rhizoclonium* growing on the rock face must be a favourite food. Also common were kina *Evechinus chloroticus* and the muricid *Xymene traversi.* A single hermit-crabbed specimen of the uncommon muricid *Xymene huttoni* was collected.

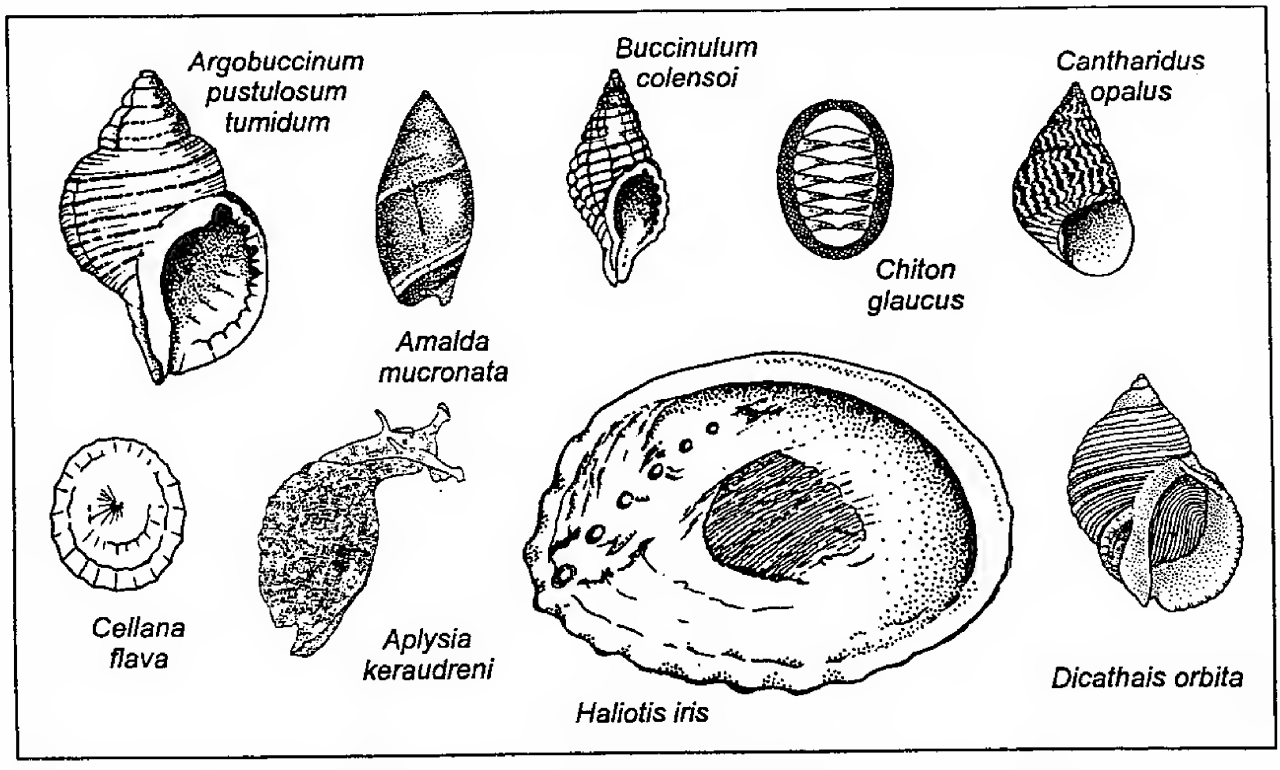


Fig. 5 Recent Molluscs from Castlepoint. Specimens drawn by Willan and Morton (1984) and Margaret Morley.

The locals had given me dire warnings about being sucked under by swells coming through the gaps in the reef. Well, it was quite exciting but not fatal! The risk was well rewarded as the fish life was prolific. Shoals of sprats, patiki, moki, maomao and many others I could not name tumbled around in the bubbling turbulence.

COMMENTS ON THE SPECIES LISTS FOR CASTLEPOINT

The 1975 (WSC 1976) and 1982 lists record 2 chitons, 41 gastropods and 12 bivalves found at Castlepoint. Of these, 9 gastropods and 4 bivalves were not found in 1995 or 2001. This is quite likely accounted for by a larger number of people collecting over a wider area. Also 5 gastropods and 3 bivalves were collected dead, which may be due to conditions at the time, such as wash up following storms. It is likely that *Herpetopoma benthicola* recorded in 1975 was *H. bella* and *Lepsiella scobina* was *L. albomarginata.* Quantities were not recorded in the 1975 list. The pre 2001 and 2001 lists show some significant differences. The most notable being the presence in January 1995 of live *Crepidula profunda, Nerita atramentosa* and the mussel *Modiolarca areolatus.* The 153 species recorded in 2001 is greatly enlarged by micromolluscs, as these were not searched for on previous visits. These were obtained in 2001 by washing algae, rocks and collecting sediment from under low tidal rocks.

Specimens in the Auckland War Memorial Museum have been recorded marked with **x** in the list.

WHAKATAKI

Whakataki is about 6 km north of Castlepoint. A few species were found here during a short visit (see species list). The only addition to the main list is the rams horn shell *Spirula spirula.*

CAPE PALLISER

A brief visit was made to the coast near the lighthouse. The local population of fur seals did not encourage a search of the rocky boulder shoreline. Molluscs found are included in the species list.

BIOGEOGRAPHIC NOTES

The following species appear to be a southern extension of recorded geographic ranges (Fig. 6). Both Cape Kidnappers and Castlepoint are promontories with the potential to trap and provide a habitat for organisms present in south flowing currents. Additional records are cited from the collections of Auckland Museum (AK) and Margaret Morley (MM). The *Crepidula profunda* specimen is now in the collection of the Department of Molluscs, Museum of New Zealand Te Papa, Wellington. The specimen of *Pholadidea tridens* is in the collection of Jenny Raven. The other specimens providing an extension of range are in the collection of Margaret Morley.

***Crepidula profunda* (Hutton, 1873)** previously recorded from Cape Maria, Northland (Powell 1979). Its range is well known from occasional dead specimens found by collectors on the east coast of the North Island to East Cape (MM). The live Castlepoint specimen now extends the range to A and C provinces.

***Eatoniella puniceomacer* Ponder, 1965** previously recorded from the north east of the North Island. The Cape Kidnappers specimen provides a range extension to A [Auourian] and C [Cookian] provinces.

***Zemitrella fallax* Powell, 1940** previously recorded from Tom Bowling Bay, Northland (Powell 1979) and Kawerua, west coast Northland (Hayward *et al.* 1995). Additional records are known from Ahipara, west coast Northland; Opito Bay, Coromandel; Destruction Gully, west coast Auckland (AM); Bland Bay, east coast Northland; Red Cliff Bay, Great Barrier Island and Princes Bay, Wellington (MM). *Z. fallax* is now known from A and C provinces.

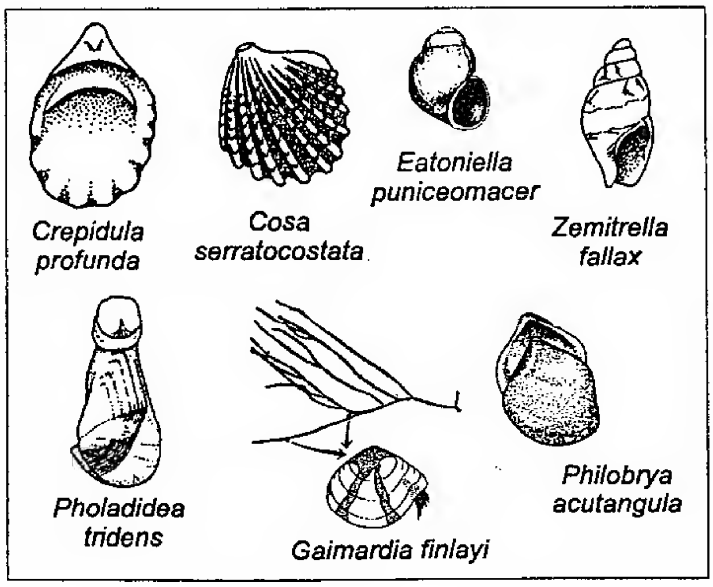


Fig. 6 Molluscs with geographic range extensions from this study. Specimens drawn by Ponder (1965), Powell (1979) and Margaret Morley.

***Cosa serratocostata* Powell, 1933** previously recorded in shell sand from Tom Bowling Bay, Northland; off Three Kings Islands in 260 m (Powell 1979) and dredged in the Bay of Islands (Morley & Hayward 1999) This species has also been found alive in the holdfast of the algae *Osmundaria colensoi* at Cape Maria van Diemen (MM). With the two records from Cape Kidnappers and Castlepoint the range for this species is now A and C provinces.

***Gaimardia finlayi* (Powell, 1933)** previously recorded from Tom Bowling Bay in shell sand and live at Whale Bay, Raglan, west coast North Island and Paua, Parengarenga Harbour; Northland (Hayward *et al.* in press). Also found attached to fronds of *Osmundaria colensoi* at Spirits Bay and Kiritehere, west coast North Island and *Corallina* turf at Mercer Bay, west coast Auckland (MM). This species shows considerable variation in shape and markings. A common form has two red radial bands, some are mostly dark red while others, especially juveniles, are entirely pale (pers. obs.). The rare specimens found at Cape Kidnappers and Castlepoint update the range for this species to A and C provinces.

***Philobrya acutangula* (Powell, 1935)** recorded by Powell (1979) from fish stomachs at the Three Kings Islands and by Morley & Hayward (2000) in the Bay of Islands. The Whakataki and Cape Kidnappers specimens update the range for *P. acutangula* to A and C provinces.

***Pholadidea tridens* (Gray, 1843)** already recorded from A and M [Moriorian] provinces. The range is now updated to include C province.

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SPECIES LIST

KEY

CK	Cape Kidnappers 2001
PN	Port Napier 2001
PAB	Pourerere, Aramoana, Blackhead 2001
C1	Castlepoint 1975, 1982
C2	Castlepoint 1995
C3	Castlepoint 2001
CL	Castlepoint lagoon 2001
CB	Castlepoint Bay 2001
W	Whananaki 2001
CP	Cape Palliser 2001
X	Auckland Museum dry collection
*	Extension of range

L = live; LC = common live; D = dead; F = fossil

	CK	PN	PAB	C1	C2	C3	CL	CB	W	CP	Comment
POLYPLACOPHORA											
Acanthochitona violacea						D					
Acanthochitona zelandica						X					
Chiton glaucus		L		L		L			L		
Ischnochiton maorianus				L		L					
Leptochiton inquinatus						L					
Onithochiton neglectus						D				X	
Plaxiphora egregia										X	
Sypharochiton pelliserpentis	L	L				L			L		
GASTROPODA											
Amalda australis				D	D		D				
Amalda mucronata				D		D					
Amalda sp.						F					
? Amphithalamus incidatus maoria						D					
Amphithalamus latisulcus						D					
Amphithalamus semen	L					L					
Anabathron hedleyi						L					
Antisolarium egenum			D								
Aplysia keraudreni						L					
Aplysia sp.						L					
Argobuccinum pustulosum tumidum				L	L	D,X					
Asteracmea suteri	D		D	D		L					
Austrofusus glans				D	D	D					
Austromitra rubiginosa	L										
Buccimulum colensoi			L		L	L					
Buccimulum linea			L	D	L						
Bulla quoyii						D					
Cabestana spengleri	D										
Caecum digitulum	L					L					
Calliostoma punctulatum				D		D					
Calliostoma tigris				D							

	CK	PN	PAB	C1	C2	C3	CL	CB	W	CP	Comment
Cantharidella tesselata	LC		L	L		LC					
Cantharidus opalus			D	L		D,X					
Cantharidus purpureus				L							
Cellana denticulata			L		L	L,X					
Cellana flava	L	X	L	L	L	X			L		
Cellana ornata		X		L	L	L					
Cellana radians	L		L		L	L,X					
Chemnitzia spp.	D					L					
Cominella adspersa			L								
Cominella glandiformis			L								
Cominella maculosa				L	L	L					
Cominella virgata						L					
Cookia sulcata	D		D	L	D	L					
Crepidula monoxyla					L	D	L				
**Crepidula profunda*					L						
Cymatium parthenopeum		X									
Dicathais orbita	L		L	L	L	L					
Diloma bicanaliculata				L							
Diloma coracina			L								
Diloma nigerrima			L			X					
Diloma subrostrata		X				D					
Diloma zelandica				L							
Eatoniella albocolumella	L					L					
? Eatoniella delli	D										
Eatoniella olivacea	L		D			L					
**Eatoniella puniceomacer*	D										
Eatonina atomaria	D										
Emarginula striatula						D					
Epitonium jukesianum			D								
Globisinum drewi		XF?									
Haliotis australis			L			D					
Haliotis iris	D		L	D		LC					
Haustrum haustorium				L	L	LC					
Herpetopoma bella			L								
? Herpetopoma benthicola				D							
Lepsiella albomarginata						L					
? Lepsiella scobina			L	L	L						
Leucotina ambigua						F					
Maoricolpus sp.						F					
Melagraphia aethiops	L		L	L		L					
Merelina lyalliana	L		D			LC					
Micrelenchus dilatatus			D	L		L					
Micrelenchus huttonii		X									
Micrelenchus sanguineus			D			LC					
Micrelenchus rufozonus										X	
Modelia granosa			D								
Neoguraleus sinclairi		D									
Nerita atramentosa						L					in 2000
Nodilittorina antipodum	LC			L	L	LC	L				
Nodilittorina cincta	L			D	L	L					
Notoacmea elongata						L					

	CK	PN	PAB	C1	C2	C3	CL	CB	W	CP	Comment
Notoacmea parviconoidea			D			L					
Notoacmea scopulina						D				X	
Odostomia incidata											
Onchidella nigricans						L					
Paratrophon quoyi				D							
Patelloida corticata				L		L					
Penion sulcatus	D		D	L							
Pervicacia tristis				D							
Pisinna zosterophila	L					L					
Pusillina hamiltoni	L					L					
Radiacmea inconspicua										X	
Ranella australasia	D										
Risellopsis varia			D			D					
Rissoina chathamensis	D			D		D					
Sagenotriphora ampulla	L										
Scutus breviculus	D		L		L	L	CL				
Semicassis pyrum				D		X				X	
Sigapatella novaezelandiae	D					D					
Siphonaria australis	L					L					
Siphonaria propria	L					L					
Struthiolaria papulosa	D	X									
Suterilla neozelanica		X				X					
Tanea zelandica											
Trivia merces	D										in 1982
Trochus tiaratus				D							
Trochus viridis	D			D	LC	D					
Turbo smaragdus	L			L	L	L					
Volvarinella cairoma			L								
Xymene huttoni			D				D				
Xymene sp.						F					
Xymene traversi			D	D	D	L	L				
? *Zeacolpus delli*	D										
Zeacolpus taranakiensis						F					
Zeacumantus lutulentus		X	D								
Zeacumantus subcarinatus		X									
Zegalerus tenuis				L	D						
Zemitrella choava	D										
**Zemitrella fallax*	D										
Zethalia zelandica	D			D	D						
BIVALVIA											
Atrina pectinata zelandica	D										
Aulacomya atra maorina		D		L	D	X	D				
Austrovenus stutchburyi	D	X									
Barbatia novaezelandiae	D										
Barnea similis	D			D		D		D			
Borniola reniformis	D					L					
Cardita aoteana				D							
Chlamys zelandiae						L					
Corbula zelandica				D							
* *Cosa serratocostata*	D					D					

	CK	PN	PAB	C1	C2	C3	CL	CB	W	CP	Comment
Cyclomactra ovata		X									
Dosina zelandica		X									
Dosinia anus											
Dosinia subrosea						D					
Felaniella zelandica						D					
* *Gaimardia finlayi*	L					D					
Glycymerita hurupiensis						F					
Hiatella arctica	L					D					
Irus elegans	D										
Irus reflexus			D			D	D				
Leptomya retiaria				L			D				
Mellipteryx parva						D					
Modlolarca impacta				L							
Modiolus areolatus					L						
Myllita stowei						D					
Mytilus edulis galloprovincialis					L		D				
Neolepton antipodum			D			L					
Nucula hartvigiana		X				D					
Nucula nitidula						D					
Paphies australis		D,X									
Paphies subtriangulata							D				
Perna canaliculus	D		L	L	L		D				
Peronaea gaimardi					D						
* *Philobrya acutangula*	D										
Philobrya munita								?			
Pholadidea suteri	D							D			
Pholadidea tridens						D					
Pododesmus zelandicus						D		D			
Protothaca crassicosta	D		D	D				D			
Pseudarcopagia disculus		D	D	D		D					
Scalpomactra scalpellum						D					
Soletellina nitida								D			
Spisula aequilatera	D		D	L				D			
Tawera spissa	D			D							
Trichomusculus barbatus						D					
Venericardia purpurata	D										
Xenostrobus pulex	LC		D	L		L					
Zeanatia acinaces						X					
Zelithophaga truncata							D				
Zygochlamys delicatula						X,F					
CEPHALOPODA											
Spirula spirula									D		
BRACHIOPODA											
-						F					

'EVEREADY' FOR A BIT OF LIGHT RELIEF ?

The authenticity of this story cannot be vouched for, but it may be true. On of the eastern side of Wellington Harbour, at Days Bay, the well-known holiday beach, there once lived an elderly couple, and they used to walk along the beach quite a lot – to keep fit, and to see what had washed up from time to time, especially shells. Windy Point, on the south end of the bay was a good place for *Tawera spissa* which they especially liked but they'd found lots of other things of interest along the tideline over the many years they'd lived there, especially after the *Wahine* disaster.

One summer they noticed a girl who was at the beach, too, pretty much every day. She wasn't especially unusual nor was the travel bag had slung over her shoulder – except for one rather strange habit; she would approach people who were sitting on the beach, glance around furtively, and then speak to them.

Generally, the people would respond negatively and she would wander off, but, occasionally, someone would nod and there'd be a quick exchange of money for something out of her bag. The couple, who felt *they* owned the beach (for they'd been walking on it for years and years) thought the end had come – this girl must be selling drugs on their beach, and they'd really have to call the police; but the husband, who of an adventurous nature, thought he'd spy on her for a bit longer to get more evidence – so they continued to watch her.

After a couple of weeks of seeing the girl regularly do the same sequence of actions, the wife said, "Honey, have you ever noticed that she only goes up to people with those awful boom box things (curse them on our beach) and other electronic nuisances?" Well, her would-be detective husband hadn't and had to admit it. Then his spouse (who thought she was a bit brighter than he was) said, "Forget *The Lord of the Rings*. Tomorrow I want you to get a towel and our big radio and just go and lie down on the sand. Then we might find out what's really going on."

Well, her plan went off without a hitch, and the wife was almost hopping up and down with anticipation when she saw the girl talk to her husband then wander off.

The man walked back across the sand and met his wife at the road. "Well", his beloved asked, "Is she selling drugs?", excitement pouring out of her voice.

"No, she's not.," he said, enjoying this probably more than he should have (it wasn't his plan anyway).

"Well. What is it then? What does she do?" fairly shrieked his wife.

The man grinned – "She's a student working a holiday job as a battery salesman."

"A battery salesman?", cried the wife.

"Yes", her husband smirked.

"She sells 'C' cells by the sea shore!"

COCKLES AND MUSSELS! ALIVE, ALIVE, OH!
A TRIBUTE TO *AUSTROVENUS STUTCHBURYI*

By Elliot Dawson

The New Zealand cockle *Austrovenus stutchburyi* has a longstanding and important place in the history and economy of our country. Known to the *Maori* people as *tuangi*, its importance to them for a thousand years and more, and continuing to this day, can be seen in the piles of burnt shells and stones that mark the sites of the middens of our first inhabitants.

Archaeologists are currently describing the specific role that shellfish played the early life of the native peoples of New Zealand, linking food values with habitant, places, and seasonal movements. Particularly striking in this regard is a fascinating, recently-published investigation dealing with these aspects for the Tuatua and Pipi (Identification, nutritional yield, economic role of tutatua shellfish, *Paphies* spp., in New Zealand archaeological sites. *People and Culture in Oceania* 17: 1-26 (2001) by B.F. Leach, J.M. Davidson, M. Robertshawe, & P.M. Leach).

Quite a lot has been found out about the ecology, populations, and general biology of *Austrovenus stutchburyi* at various places in New Zealand; much of this is in university theses, hopefully to be published in due course. Some of us still cling to the old generic name of *Chione*, but it is interesting now to find it has a new common name, maybe for "export only".

To-day, the New Zealand Cockle seems to be the subject of quite a big export business. , marketed overseas as "New Zealand Littleneck Clams" (although clearly sublabelled *Austrovenus stutchburyi*"). The Littleneck clam is a member of the Veneridae too, but is actually *Protothaca staminea*, hence quite close to our *Protothaca crassicosta*; other names for this species are the Tomales Bay Cockle, the Common Littleneck, the Rock Cockle, the Rock Clam, or Steamer or Butter Clam, and on the East Coast of North America (it is found on the West Coast from Alaska to California) it's called the Pacific Littleneck. I suspect the precise labelling of food items necessary under the US Food and Drug Act really has something to do with this "export" name. It's been so for some the so-called "king crabs" on which I've worked. Although there are nearly a hundred species of king crabs in the world scene, until a few years ago only one species was recognised under that Act and, hence, could sold in the USA. They've got a few more, including some New Zealand species, on the official list now. But it would be a pity if our edible molluscs all needed to have new names for the export business – Chinese Gooseberries, Kiwi Fruit, Zespris – take your pick. *Tuangi* is a good Maori name but mightn't ring any bells in California or Florida.

Williams' *Maori Dictionary* (5th ed., 1932) gives the following names for "*Chione stutchburyi*" –
Tuangi, huangi, huangiangi, huai, and hungangi, and it can be used for a "bivalve mollusc" in general, also for "*Paphia costata*". *The Oxford Maori Picture Dictionary He Pukapuka Kupuahua Maori* (Oxford University Press, 1978) gives coloured pictures of various shellfish with their Maori names, one of which is the N.Z. Cockle termed therein '*tuangi*'. Powell's *New Zealand Mollusca* (1979) uses the names 'huangi' and 'tuangi', as in the early editions of *Shells of New Zealand.*

Simon Gilmour of Southern Clams Limited, Dunedin, recently told me the following:

"The reason the name Littleneck Clam is used is that 90% of our sales are in the live market on both the West and East coasts of the USA. The Tuangi fit neatly into this niche and being a clam rather than a cockle readily slot into the American clam market. We sell different size grades into the two coasts and Honolulu, to meet the different dishes being prepared by people from different cultural backgrounds. In Otago we have a very large resource with very little fishing pressure from the predominantly European community, clams not being part of the cuisine and their delicacy value still goes unappreciated. For the local Runanga they are considered a taonga species, and grow to a large size in close proximity to the Marae."
Interestingly, he concludes – "The probable reason for the large population in the Harbour and inlets here is the stable salinity of these inlets, none of them having a major freshwater runoff or river flowing into them".

Anyway, did you try any of the recipes in the last issue of *Cookia* ? Here's some more (reprinted with the support and permission of Rainbow Seafoods of Dunedin, whose "New Zealand Littleneck Clams" are distributed by Southern Clams Limited).

They tell us, for a start –

"The New Zealand littleneck clam is already being exported to a dozen countries throughout the world. It is harvested in the brilliantly clear and unpolluted waters of our Pacific Ocean and complies with the New Zealand government and

USFDA standards. Nutrition (per 100 g): calories 46; cholesterol 30 mg; protein 7.6 g; iron 5 mg; fat 0.9 g; sodium 716 mg; Omega 3.01 g; calcium 51 mg." And some hints – "Storage – Kept in a well drained container, clams will remain fresh 12 days chilled at 2° to 4° C. Do not store under water. Cooking clams – Scrub shells under running water to rid them of any sand. Discard any shellfish which gape and not respond when tapped. Place clams in a large pot over high heat, cover and steam until all shells are open. Shake the pot once or twice during cooking or move the clams around with a wooden spoon. This should only take a few minutes, as clams need very little cooking if they are to remain tender. Keep the juices and strain or decant before using. Clams being naturally salty, there is no need to add salt."

Now, they've suggested a recipe or two –

CLAMS MARINIÈRE (serves 4)

- 1.5 – 2 kg New Zealand Cockles (preferably "Southern Clams" from Rainbow Seafoods !)
- 1 medium onion, finely chopped
- 1 clove garlic, crushed
- 2 Tbsp of fresh parsley, fine chopped [not a "metric" measure, but nevermind]
- 1 bay leaf (optional)
- ½ cup dry wine
- 1 Tbsp butter
- freshly ground black pepper
- ¼ cup cream

Scrub the clams thoroughly and place in a large saucepan with onion, garlic, half of the parsley, and the bay leaf. Add the wine and 1 Tbsp of butter; then grind a little black pepper on top. Cover tightly and steam until the clams open. Remove the clams to a warm serving dish. Strain clam liquid and add extra pepper to taste. Add cream and the rest of the parsley. Reheat the clam sauce but do not boil. Pour the sauce over the clams and serve immediately.

Ready for more ? I am – almost salivating while I'm typing this …

CREAMY CLAM CHOWDER (serves 4)

- 1.5 – 2 kg of clams – as before !
- 1 cup of water
- 100 g bacon, diced
- 1 Tbsp butter
- 2 onions, diced
- 1 Tbsp flour
- 4 cups peeled potatoes, diced
- freshly ground black pepper
- 1 cup cream
- 3 cups milk
- Garnish: Paprika, chopped parsley or coriander

Scrub the clams thoroughly and put them in a large saucepan with the water. Cover tightly and steam until the the clams open. Strain liquid and make up to 4 cups with water. Remove clams from the shells and chop coarsely. In a large saucepan, sauté bacon in butter until crisp. Remove bacon and keep for a topping. Add onions to saucepan and sauté until transparent. Add flour and cook for a minute or so, stirring constantly. Add diced potato, pepper, and clam liquid. Cover and simmer 15-20 minutes, until potatoes are tender. Purée the potatoes at this stage if you want a smooth chowder rather than a chunky one. Add cream, milk, and clams. Reheat but do not boil. Add more seasoning if necessary. Serve hot, topped with cooked bacon and sprinkled with garnish.

Yumm- me! As someone once said …

Time for another ? Try this …

WOK FRIED CLAMS (serves 4)

- 1.5-2 kg of clams ("Southern Clams" if you please!)
- 3 Tbsp olive oil [frightfully good for you I'm told]
- 1 green or red pepper, finely sliced
- about 2 cups of broccoli or other green vegetable

- ¼ tsp chilli powder [better to make this one "metric" otherwise you'll feel it!]
- 1 tsp root ginger, grated
- 2 cloves garlic, crushed
- 1 tsp cornflour dissolved in a little cold water
- 2 tsp soy sauce
- ½ cup white wine
- freshly ground black pepper

Scrub the clams thoroughly. Heat the oil in a wok. Stir fry clams until their shells spring open. Remove from the wok, saving 4 Tbsp of juices from the wok. Stir fry vegetables; then add the soy sauce, wine, and spices. Replace the clams and the rest of the juices. Bring to the boil and thicken with the cornflour. Garnish and serve.

What a night !

On other pages of this issue of *Cookia* you can read about the New Zealand Cockle as the dominant part of the marine fauna of the Pauatahanui Inlet near Wellington where is regarded as a vital indicator of the "health" of that environmental setting. A really excellent resource kit, written by Neil Bellingham, has been published by the Guardians of Pauatahanui Inlet. It contains all sorts of ideas and suggestions for projects that could be done on the cockle at various schhol class levels but which could also, I venture to say, attract the energies of such groups as ours, not necssarily applied top Pauatahanui itself but to other species and other places, particularly still under threat for economic development as is Pauatahanui, still, despite the best intentions and care of local authorities. I'm not sure I would describe the waters of Pauatahanui Inlet as "brilliantly clear and unpolluted" but we'd all like to think that the cockles there will eventually get back to thriving good health for all time. I commend this kit to everyone with an interest in the live animal and its place in nature (a copy of the kit is now in our Club library - look at it, and be equally stimulated).

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WELLINGTON SHELL CLUB

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WELLINGTON SHELL CLUB

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COOKIA is the journal of the Wellington Shell Club and is published annually, containing articles and smaller items of interest on shells, shell collecting, and molluscs as well as other related topics Members and other readers are invited to submit contributions (handwritten, typed, or electronic, equally acceptable) but, preferably, these should be in the Editor's hand before the end of May for inclusion in that year's issue (look at a recent issue to see the style to follow).

Cookia was first published in 1976; prior to this the Club published a *Circular*, then a *Bulletin*, as well as occasional *Study Notes* on various families of Mollusca.

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1956-1965 *Circular* 1 to 21
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1977-1978 *Cookia* Volume 2, Nos 1, 2, 3
1979-1980 *Cookia* Volume 3, Nos 1, 2, 3
1980-1981 *Cookia* Volume 4, Nos 1, 2, 3
1982-1984 *Cookia* Volume 5, Nos 1, 2, 3, 4
1985-1992 *Cookia* Volume 6, Nos 1, 2, 3, 4
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1998 *Cookia* Volume 9
1999 *Cookia* Volume 10
2000 *Cookia* Volume 11
2001 *Cookia* Volume 12

(*Cookia* Volume 7, No. 4, is an index of all articles in the Club's publications to 1996)

BACK NUMBERS

Back numbers of *Cookia* are available at $4.00 per copy plus postage; individual articles, and copies of the Bulletins, Circulars and Study Notes can be ordered at 10c per page plus postage, from *The Treasurer, Wellington Shell Club, 84 Brougham Street, Mt Victoria, Wellington, New Zealand*; or see our homepage at www.actrix.gen.nz/users/littlejn